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PULMONARY OEDEMA*

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Once again we have assembled to do honour to one of our great men, Sydney Ringer. With pride we recall Ringer's achievements as an original investigator whose discoveries brought fame to this Medical School and its parent, University College, his outstanding qualities as a physician, and his genial humanity. We like to think, with the ancient Greeks, that "a spirit of reverence pervades our public acts," and it is with humility I add my small contribution to the distinguished offerings which have preserved the memory of Sidney Ringer in his spiritual home.

I have chosen the topic of pulmonary oedema with some diffidence, though I believe it to be a subject which would have interested him; possibly he, too, would have found cause for dissatisfaction in the imperfection of our knowledge of an unusually elusive problem. I doubt whether any remarks of mine can do much to bring light into our darkness, but at least I can try to place before you some facts which I hope may arouse thought and lead to future action.

In defining my problem I can do no better than quote the words of the great Laennec (1834): "Oedema of the lungs is the infiltration of serum into the substance of this organ, in such degree as evidently to diminish its permeability to the air, in respiration." It comes on most commonly with other dropsical affections, in cachectic subjects, towards the fatal termination of long-continued fevers or organic affections, especially those of the heart. It often takes place only a few hours before death, though it may last several weeks or even months. The morbid appearances of the lungs excite curiosity through the loss of the slightly rose tint of the normal organs, the failure of the organs to collapse when the chest is opened, and the dense heavy tissues which retain the impression of the finger more tenaciously than the normal lungs. When cut into, an abundance of fluid, which is either colourless or very slightly tawny, transparent, and "just perceptibly spumous," flows from the severed surfaces. When of recent occurrence the fluid is very frothy and resembles white of egg dissolved in equal parts of water, adhering to the bottom of the vessel containing it when this is reversed. No change in the integrity of the alveolar structure of the lung is apparent. The symptoms are those of impeded respiration, with slight cough and more or less watery expectoration, and the master of the stethoscope recorded that respiratory sounds are much feebler than might be expected from the great dilatation of the thorax, and bubbly sounds can be heard on auscultation. A century of investigation has added little to Laennec's description, though, as I hope to show, some progress has been made in the elucidation of its aetiology.

*Sydney Ringer Memorial Lecture given at University College Hospital Medical School on March 16.

Before confining myself to that section I should like to draw attention to two Tables prepared from a survey of our necropsy records. Table I is an analysis of 100 unselected cases of pulmonary oedema, and illustrates the diversity of pathological conditions which may terminate in lung oedema. It also shows that certain of these conditions appear much more often than others. In Table II

TABLE I.—*Main Necropsy Findings in 100 Cases of Pulmonary Oedema*

Pathology	No. of Cases
Severe coronary disease	34
Congestive cardiac failure	32
Carcinoma of various sites, including carcinoma of lung (15 cases)	27
Wasting, moderate	25
" severe	19
Bronchopneumonia	23
Hypertensive disease	18
Chronic bronchitis alone	14
Carcinoma of liver	11
Obstruction of pulmonary veins by carcinoma	11
Massive pulmonary embolism	10
Cerebral haemorrhage	9
Cerebral tumour	7
Tuberculosis	6
Cirrhosis of liver	6
Fractured skull	3
Multiple fractures (excluding skull)	2

TABLE II.—*Frequency of Pulmonary Oedema in 500 Necropsies of Cardiovascular Disease, Cerebral Injury, and Multiple Fractures*

Pathology	Total No. of Cases	No. Showing Pulmonary Oedema
Hypertensive disease (excluding chronic nephritis)	94	81 (86%)
Chronic nephritis	50	37 (74%)
Complete coronary obstruction	66	45 (68%)
Cerebral haemorrhage	66	44 (67%)
Mitral stenosis	84	55 (65%)
Fractured skull	38	24 (63%)
Multiple fractures (excluding skull)	28	17 (61%)
Pulmonary embolism	74	23 (31%)
Total	500	326 (65%)

I have gathered together a fairly large series of the special cases, and have recorded the frequency with which extensive oedema of the lungs was found at necropsy. I might say that only two pathologists were concerned in the examination and that microscopy confirmed the diagnosis in every instance. I think it will be agreed that cardiovascular disease, especially hypertensive forms, is a potent factor, but no less striking is the association between central nervous disturbance and oedema of the lungs. These conclusions are in agreement with recorded experience; they represent the starting-point of much experimental work, which is still yielding a bountiful harvest of ideas. To these observations of everyday practice must be added many from the more specialized fields of toxicology, industrial

medicine, and even war. Lung oedema arising from the action of gases and drugs has proved a fruitful field of investigation because of the ease with which these agents lend themselves to controlled experimentation. It will be my aim to disentangle from this complex mass of facts some general principles which I trust will prove useful in planning future investigations into an unsolved puzzle.

Oedema Caused by Irritating Gases

My interest in lung oedema was first aroused in 1937, when a member of the department of chemical pathology in our medical school contracted jaundice for which no cause could be found. His physician, Dr. Max Rosenheim, discovered that there had been exposure to the gas ketene for some little time. A vague impression existed among chemists that ketene is dangerous, though no real reason for this view was known, and I had to admit that I could give no opinion. We discussed the problem with Professor C. R. Harington, who encouraged us to go ahead with an investigation of the properties of the gas. Working with mice, Cameron and Neuberger (1937) soon found ketene to rival phosgene in its action on the lungs; oedema of the air spaces developed with great rapidity, and the animals showed bizarre leapings and struggles in a veritable dance of death. We found no changes other than asphyxial in the tissues, and since the heart continued to beat for some time after death we decided that ketene caused respiratory failure through a direct action on the protoplasm of the lung capillaries whereby they became extremely permeable to the blood plasma, which gushed out into the vital air spaces, drowning the animal. Our results, modified slightly in assessment of activity, were subsequently confirmed by a group of workers led by Professor H. Emeleus at the Imperial College of Science.

During the late war my experience of irritating gases was greatly extended at the Experimental Station, Porton, and I want to say something about one of these gases—phosgene. Much human experience accumulated in the 1914–18 war suggests that phosgene is a poison for the lung capillaries. All clinical features of the catastrophe which follows upon exposure can be explained by the simple hypothesis of fluid outpouring into the lungs and the consequent modification of the blood of the individual. Investigations in which I have been closely associated with F. C. Courtice, R. H. D. Short, and G. L. Foss have confirmed the old view. Just as with man, laboratory animals exposed to quite low concentrations of phosgene pass through a latent period in which little seems to be happening, although some species—e.g., the guinea-pig—present unmistakable features of bronchial spasm or obstruction, and others—e.g., dogs—may suffer for a time from slowing of the heart-beat. But sooner or later more serious respiratory symptoms set in and pulmonary oedema spreads over the lungs with increasing speed until the animal is engaged in a desperate battle for life. Whether or not death is to be the outcome depends to a large extent upon the severity of exposure to the gas.

An exact analysis of this type of pulmonary oedema is now possible because of the numerous studies carried out in this country and in the United States (Coman *et al.*, 1947). Everyone agrees that inhaled phosgene exerts its effects on the lung capillary membranes and in so doing is rapidly hydrolysed so that none of the gas reaches the general circulation to poison tissues elsewhere in the body. Attempts to demonstrate structural modification of affected capillaries have for the most part failed, largely owing to technical difficulties associated with the very thin lining cells of these vessels. However, Short (1942) with great skill succeeded in showing that the mitochondria of endothelium split up and disappear before the capillaries begin to leak. Since mitochondrial reactions are accepted as the most sensitive cell responses to injury I believe we must accept Short's demonstration as satisfactory.

The fluid which fills the air spaces contains a high percentage of plasma protein but for a long time is almost free from cells, hence it is a true transudate from the blood vessels. Large amounts of protein may be lost from the circulation in this way, and the depletion is reflected in a fall in the protein concentration of the blood. By the use of modern methods for the estimation of the plasma volume of animals we have shown that an increasing oedema of the lungs is closely paralleled by a decrease in the circulating blood plasma (Cameron and Courtice, 1946). By weighing the lungs of dogs and goats killed at varying times after exposure to phosgene, and comparing the protein content of fluid gently expressed from such lungs with the amount of protein lost from the circulation, we could establish fairly satisfactorily a transfer of plasma from blood to lung spaces. As the result of this plasma loss the blood becomes very much more concentrated, for the blood-cell volume persists unchanged or is even somewhat augmented.

A strange anomaly was encountered when rabbits were used for similar experiments. No haemoconcentration developed despite massive losses of plasma into the lungs, so that it appears that the rabbit, in contrast to the dog and goat, must carry a readily available store of fluid from which it speedily replaces the lost plasma. When rabbits were kept on a drier diet than usual before exposure to phosgene pulmonary oedema was frequently accompanied by concentration of the blood, an observation which suggests that our explanation is correct.

Whilst the plasma is pouring into the air passages an interesting phenomenon is going on in the lymphatic circulation of the lungs. The researches of C. K. Drinker and his school have provided us with satisfactory methods for collecting lymph from the lungs of the dog, and we at Porton were fortunate enough to obtain instruction in canalization technique from Professor J. Yoffey, of Bristol, himself a distinguished worker in the field of lymphatic physiology. Dr. Courtice soon became a master of these difficult procedures and was able to follow the flow of lymph from the lungs of animals exposed to phosgene. He found that, as oedema develops, the lung lymph steadily increases and may reach a level many times the normal. Short and I had already been impressed by the extraordinary dilatation of the lymphatic plexuses closely associated with large pulmonary blood vessels and the bronchi, an observation which receives its explanation from Courtice's studies on lymph flow.

For a time, no doubt, this increased drainage compensates for plasma outflow from the injured lung capillaries and helps to keep the lungs dry, but sooner or later the rather sluggish mechanism breaks down at the bottle-neck where the copious intrapulmonary lymphatics converge to form a few main lymph channels, and oedema then progresses unchecked unless the capillaries regain their normal impermeability for proteins. The major risk is anoxia as fluid fills up the air spaces, and this is reflected in the dyspnoea which now sets in along with biochemical changes in the blood. Giving the animal unlimited amounts of oxygen brings no relief (Boche *et al.*, 1947). At this stage, too, extreme haemoconcentration may add its burden to the circulation, and a falling blood pressure gives warning of a labouring heart. Apparently little in the way of relief from the intolerable load of oedema fluid can be expected by way of direct absorption through the lung capillaries.

It has long been known that simple fluids such as physiological saline are removed with speed from the air spaces (Cohn, 1873; Winternitz, 1920). Courtice and Phipps (1946), in confirming this observation in rabbits and dogs, have shown that most of the saline is absorbed direct into the blood capillaries; for in the dog, at least, there is only a small increase in lymph flow from such lungs. Serum, in contrast, is very slowly absorbed from the air passages, persisting in the lungs for about four days. The little that is removed seems to leave by way of the lymphatics. These important observations of Courtice and Phipps must be of great interest to pathologists, since they afford an explanation of the slow resolution of a pneumonic exudate. No doubt retained protein favours bacterial growth, and I am reminded of the emphasis placed upon pulmonary oedema as a precursory state to pneumonia by Robertson (1938).

Further evidence of the abnormal permeability of the lung capillaries after gassing with phosgene is seen in the striking experiments of Courtice and Foss (1946) on the effects of plasma replacement. Arguing that severe circulatory collapse in the late stages may be due partly to falling plasma volume, the outcome of lung oedema, they transfused gassed dogs and goats with large amounts of concentrated serum and normal plasma and serum, only to find that the transfusate left the circulation very rapidly and the general condition of the animals worsened

Courtice and Foss concluded that transfusions are contra-indicated in the presence of gross pulmonary oedema—a statement which deserves careful consideration from clinicians. American investigations are in close agreement with the British studies.

Early Circulatory Embarrassment

I must now discuss the possibility of early circulatory embarrassment in this type of pulmonary oedema, for it might be argued that much of the trouble results from increased filtration of fluid from capillaries in which the hydrostatic pressure has been raised well above the colloid osmotic pressure of the plasma. Let me first remind you of the main facts about pulmonary circulation. The lungs consist of a gigantic though extremely thin membrane across which diffusion of the gases of respiration takes place. In close contact is an immense capillary plexus 120 to 140 square metres in extent, in which the blood is separated from the air by an average distance of about 1.4μ (Roughton, 1945). Not all of these capillaries are open at any given moment when the individual is at rest or engaged in mild exercise (Cohnheim and Litten, 1875; Toyama, 1925; Wearn *et al.*, 1934), but when the emergency arises a greatly increased vascular bed becomes available as a blood depot.

In resting man only one-twentieth of the total lung surface suffices to maintain normal oxygenation of the blood, hence the margin of safety is great. With each contraction of the heart about 3.12 litres of blood per minute per square metre body surface is expelled (Cournand *et al.*, 1945) at the rather low head of pressure in the pulmonary artery of 18–30mm. Hg (Bloomfield *et al.*, 1946). This amount of blood takes something like three seconds to traverse the lung circulatory bed, though there is some disagreement about the lung circulation time (Blumgart and Weiss, 1927; Weiss, 1942), of which 0.75 ± 0.25 second is spent in passing through the capillaries (Roughton, 1945). No doubt the velocity of flow varies in different parts of the lungs, being slower at the base than in the upper parts. Here, too, because of gravity the pressure within the vessels is somewhat higher. The capillary hydrostatic pressure is not known with any certainty, but it must be less than the normal diastolic pulmonary arterial pressure, which is about 11 mm. Hg, and greater than the pulmonary venous pressure, which is near to 7 mm. Hg (Bazett, 1941). Probably 9–10 mm. Hg is a fair estimate.

Obviously the effective peripheral resistance of the pulmonary system is low and normally plays a small part in controlling the circulation. Now, the colloid osmotic pressure for pulmonary blood is, so far as we know, that of the blood in general, which is variously stated as 18.3 to 25 mm. Hg (Verney, 1926; Landis, 1930; Muntwyler *et al.*, 1933; Kerkhof, 1937). This means that conditions favour retention of fluid within the pulmonary capillaries even when we take into consideration the sub-atmospheric ("negative") intrapleural pressure fluctuating about a mean of 5 cm. water (Prinzmetal and Kountz, 1935; Drinker, 1945), which favours outflow from the capillaries. Of course, some water does leave these vessels as vapour in the alveoli, but it is small in amount. In other words, circulatory arrangements within the normal lungs are such as to keep the air passages dry. Moreover, the generous safety margin at the disposal of the vascular bed allows for considerable enhancement of blood content without a serious strain being placed upon the vessel walls. And, finally, there are compensatory devices available in the form of reflexes (Bainbridge, 1915), by which a rising pressure within the pulmonary veins initiates acceleration of cardiac contraction, with more rapid removal of blood from the lungs.

The experimental study of phosgene oedema has given no evidence of interference with the pulmonary circulation, or of right heart embarrassment until the last stages are reached (Barcroft *et al.*, 1918; Patt *et al.*, 1946). Shaw Dunn (1919–20), working at Porton during the 1914–18 war, stressed the importance of intracapillary thrombosis, but Dr. Short and I convinced ourselves that such capillary findings are the result of stasis from concentration of the blood due to loss of oedema fluid. The American investigators working under the leadership of Professor R. W. Gerard, of Chicago (Patt *et al.*, 1946), found that dyes pass through the pulmonary vessels quite easily. Their demonstration of a prolonged pulmonary circulation time with adequate oxygenation of the blood also shows that no extensive block can exist. It is only when oedema becomes pronounced that serious disturbance of the lung circulation sets in. Likewise, cardiac dilatation and venous engorgement are inconstant and usually of late occurrence, venous pressure rarely shows an appreciable increase (Eyster and Meek, 1926; Patt *et al.*, 1946), and no reason for accepting back-pressure effects in the lungs emerged from direct measurements of right ventricular and pulmonary artery pressure in gassed dogs and cats. I must emphasize that the American work was carefully controlled and involved all extremes of severity of gassing. The conclusion is inescapable that the compensatory mechanisms and vascular reserve of the lungs are so well developed as to be capable of dealing with all but the most violent disturbances of heart and circulation.

The lesson which emerges from these studies is that pulmonary oedema may result from injury of the lining cells of the lung capillaries alone, whereby the permeability for proteins is increased and escape of plasma into the air spaces follows, leading eventually to anoxia and death from respiratory failure in the most severe cases.

Although the functional investigation of the effects of a number of gases is not as complete as in the case of phosgene, there is little reason to doubt that similar mechanisms are concerned. Among such gases may be included mustard-gas vapour, lewisite vapour (Cameron, Courtice, and Short, 1947), chlorine, nitrous fumes, ammonia vapour (Miller and Matthews, 1909), acetic ether (Miller and Matthews), and many irritating smokes.

In conclusion, I wish to make it clear that the march of events in all these examples is a fairly slow one, extending over hours and sometimes days rather than minutes. Nevertheless, a paroxysmal course may be encountered when high concentrations are breathed or when, as human experience suggests, a severe demand is placed upon the circulatory system by violent exertion.

Pulmonary Oedema due to Absorption of Chemicals

It has been known for some time that a variety of drugs can produce pulmonary oedema after absorption into the blood stream. Among these are acetic and butyric ether, iodides, methyl salicylate, muscarine, eserine, and the newly introduced compound thiourea and its chemical relatives. No doubt many other examples could be added to this list. The ethers act with rapidity when injected intravenously into rabbits or dogs, and disturbances of circulatory function have been recorded. Thus a rapid increase in pressure within the left auricle and pulmonary artery, together with a fall in systemic arterial pressure, was noted by Löwit (1893) in some animals. Although not infrequently reverse effects were obtained by him, pulmonary oedema was equally severe in either case. Since these disturbances were only transitory, Löwit concluded that there could be no question of lung stasis as the initiating mechanism for the oedema, and he argued, with some astuteness, that the main factor must be alteration in the vessel walls with leakage of fluid, since oedema in other tissues often occurred in the presence of these agents.

A little later Van Zeissl (1895) reached a similar conclusion from his studies with iodides, wherein he demonstrated rising left auricular pressures but inconstant alterations in pulmonary arterial pressure. He, too, emphasized changes in the pulmonary capillaries and suggested that these might obstruct the blood flow from the lungs. Much the same uncertainties about circulatory behaviour were experienced by Grossman (1887, 1891) and Löwit with muscarine oedema, and by Teissier and Guinard (1901) with methyl salicylate oedema. The latter, working with curarized vagotomized dogs, sometimes obtained a rise in left auricular pressure, sometimes a fall. More recently Lathrop (1932) and Lindsey (1937) have emphasized toxic damage to small blood vessels in various parts of the body as the result of salicylate poisoning. A respiratory factor may also be concerned, for hyperpnoea and acidosis are not uncommon features due to medullary damage (Troll and Menten, 1945). Unfortunately, all such studies are far from complete, often open to serious criticism on technical grounds, and seldom well controlled.

Of great interest is the pulmonary oedema which develops a few hours after the administration by various routes of certain sulphur derivatives of urea. Richter and Clisby (1942) noted early pleural effusion accompanied by progressive exudation of fluid into the air spaces when rats were fed phenyl thiocarbamide, and recognized these effects as being due to a primary toxic action on the capillaries. No oedema appeared in tissues other than the lungs and pleurae. Since some of the compounds we were concerned with at Porton had affinities with thiourea, our colleague, Miss R. P. Jones, decided to investigate their properties, especially their action on the thyroid gland; for Astwood and his co-workers had already drawn attention to this aspect of certain members of the group. She found that four compounds—α- and β-naphthyl thiourea and $\alpha\alpha$- and $\beta\beta$-dinaphthyl thiourea—in toxic doses induced massive pleural effusions and pulmonary oedema which might lead to death in one to two days or resolution in about four days. No impairment of circulatory or nervous function was apparent in any of these animals until the last moments of life, and no pathological changes were discovered in the organs apart from the respiratory system and the thyroid gland (Jones, 1946). It seems likely that we are dealing with a specific action on the lung capillaries accompanying an even more specific influence on the cells of the thyroid gland. Drinker (1945) has reached a similar conclusion from investigations on dogs, and Dr. Courtice is in agreement, although his findings have been somewhat variable.

The interest of this group of agents is that they modify the permeability of the lung capillaries, apparently without affecting any other capillary conglomerates. This action is a steadily progressive one and is completely divorced from serious disturbance of the cardiovascular, renal, and nervous systems. Localized oedemas, however, are by no means confined to the lungs, as witness the oedema of the head and face induced in rabbits by the administration of paraphenylene diamine (Tainter and Hanzlik, 1924–5) and the oedema of the sexual skin of monkeys (Zuckerman and Fulton, 1934). The angioneurotic oedemas of man and uraemic lung oedema may belong to the same category.

Pulmonary Oedema Associated with Nervous Disturbance

There is a widespread opinion among clinicians that acute pulmonary oedema not infrequently terminates the course of many disturbances of the central nervous system. The list of lesions is fairly long and includes cerebral haemorrhage, thrombosis, embolism, tumour, encephalitis, myelitis, meningitis, tabes dorsalis (Fourneau, 1897–8; Lian, 1931, Bezançon *et al.*, 1932; Gernez and Marchandise, 1933; Hess, 1934), epilepsy (Shanahan, 1908; Ohlmacher, 1910; Langeron, 1925), and head injuries with cerebral laceration and intracranial haemorrhage (Moutier, 1918; Laubry and Cottet, 1935; Benassi, 1937; Weisman, 1939). Our necropsy records at University College Hospital show a high incidence of severe lung oedema in patients dying from cerebral haemorrhage (not traumatic—67%) or fractured skull (63%).

The experimental elucidation of this serious complication has made little progress, though guesses have not been wanting about its mechanism. The chief obstacle is the lack of a reliable method of producing neurogenic oedema. Bilateral vagotomy is often quoted as satisfactory (Farber, 1937; Luisada, 1928), despite the demonstration by Frey (1877), Schafer (1918–20), and, more recently, Short (1944) that the lung lies open to the aspiration of food and oral secretions because of laryngeal paralysis. Short was impressed with the importance of slow asphyxia as a factor in causing pulmonary changes, among which was oedema, though this was by no means a constant development. I believe he has done good service in emphasizing this complication, for many of the methods employed in the demonstration of neurogenic oedema are such as to induce anoxia, and no conclusion can be drawn about nervous action on vascular permeability. This criticism may well apply to the experiments of Jores (1906), in which the insertion of foreign bodies within the smaller bronchi led to rapidly developing localized lung oedema. Faradic stimulation of lung also gave oedema, which Jores attributed to vasomotor disturbance, but unfortunately his experiments were imperfectly controlled and could not be confirmed by Kotowschtschikow (1913). Other methods claimed as satisfactory for inducing neurogenic oedema include obstructing the blood supply to the brain (Mayer, 1878; Meurers, 1925), suboccipital injection of veratrine (Jarisch, Richter, and Thoma, 1939), and stimulation of the stellate ganglia (Brown-Séquard: quoted by Gernez and Marchandise, 1933), but information is usually incomplete and results appear to be uncertain.

Recently Dr. S. N. De and I, while working on the production of hydrocephalus, hit upon a method of producing pulmonary oedema which offers great possibilities. We set out to glue the meninges of rats together by injecting intracisternally a solution of fibrinogen followed immediately afterwards by thrombin, the idea being that a fibrin film would be formed within the cisternae which would interfere with the circulation of the cerebrospinal fluid (Fig. 1). To our surprise most of

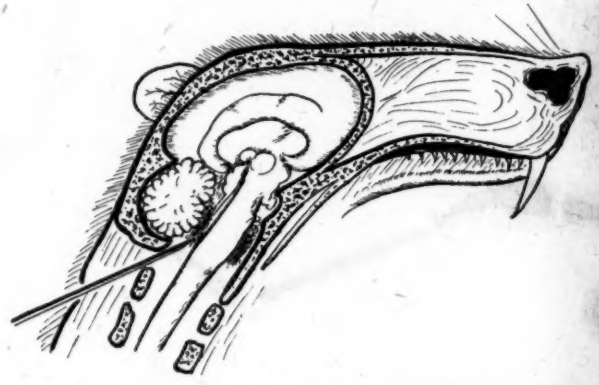

FIG. 1.—Diagram showing site of intracisternal injection of fibrin; the manœuvre leads to pulmonary oedema in rats and rabbits.

the animals died of acute pulmonary oedema within a few minutes. The experiment has been repeated many times now, both in rats and in rabbits, and always with the same result. The lungs of such animals are remarkably similar to those gassed with phosgene. Since the fibrinogen was obtained from human sources it was essential that its "foreignness" be controlled, and De showed that intracisternal injection of human plasma in comparable or greater amounts gave no oedema. Varying the pressure of introduced fluids apparently plays no part. Preliminary studies suggest that dividing both vagi reduces or even prevents the occurrence of lung oedema. The investigation is being pursued vigorously at the moment and it would not be wise to draw many conclusions until the work is complete, but it is our impression that we are dealing with a cerebral type of pulmonary oedema, possibly the result of disturbance of intracranial pressure. That pressure upsets can lead to lung oedema seems apparent from experiments performed on dogs and rabbits by Benassi (1937), in which pressure was raised by intracranial injections of fluid after trephining. I believe that we have in the fibrin method a valuable tool for the study of many problems associated with neurogenic oedema.

Luisada and Sarnoff's Method

Another experimental method which deserves consideration has recently been described by Luisada and Sarnoff (1946). If massive quantities of saline or blood are rapidly injected under high pressure into the common carotid arteries of dogs in the cranial direction of the vessel, acute pulmonary oedema develops within a few minutes (Fig. 2). Similar amounts of fluid introduced into the femoral arteries or veins give oedema with much less frequency. The systemic and venous pressures rise for a short time, but are not maintained, and there is only slight cardiac disturbance. Oedema is more severe when viscous fluids are used than with saline, probably because of slower excretion. Denervation of the carotid sinus reduces the extent of the oedema, but vagotomy has no influence. Drugs such as phenobarbitone and morphine inhibit the oedema. Luisada and Sarnoff suggest that reflexes arising in the carotid sinus or from the cardiovascular system elsewhere as the result of a sudden increase in blood volume or pressure bring about

changes in the pulmonary vessels with altered permeability and leakage of fluid.

Dr. K. K. Cheng has lately shown that the same procedure works with rabbits. He has estimated the protein content of the oedema fluid and finds this to be about 1%, which suggests that much of the fluid may be the saline which was injected or, alternatively, that permeability of lung capillaries is not greatly increased. Whatever the explanation of the oedema may be, it seems to me that experiments of this kind are worth while as a starting-point for the further study of the vexed question of nervous influence on capillary permeability.

There is little doubt that the lungs are richly supplied with nerve fibres (Larsell and Dow, 1933) emanating from the vagus and sympathetic systems. Some of these are closely connected with the blood vessels and may be concerned in the control of the blood-storing capacity of the organ, though uncertainty still handicaps our theories (Wiggers, 1921; Daly, 1933). Others terminate around the bronchioles and alveolar ducts, where they pick up the stimuli which initiate and control respiration. A series of reflexes adjust the pressure and blood-flow relationships between the lungs on the one hand and the cardiovascular system on the other. Sensitive receptors are present in the pulmonary artery (Daly and Verney, 1927; Brunelli, 1933; Schwiegk, 1935; Heymans, 1938), pulmonary veins (Brunelli, 1933; McDowall, 1935; Nonidez, 1937), right auricle (McDowall, 1934, 1935), and the ventricles (Daly and Verney, 1927; McDowall, 1934; Rubino, 1937), as well as the venae cavae (Bainbridge, 1915; Sassa and Miyazaki, 1920; Nonidez, 1937), from which nerve impulses stream to the carotid sinus, peripheral vessels, and brain (Heymans *et al.*, 1933; Hochrein and Keller, 1934; Jarisch *et al.*, 1939; Jarisch, 1940) as well as from one vascular component to the other. How important these are in the fully compensated organism remains to be determined. A close relationship surely exists between the systemic and pulmonary circulation, but how much of this is nervous is still undecided. For some time the impression has been growing that some such nervous mechanism may influence the permeability of the lung capillaries, and disturbance of this at various functional levels may be responsible for neurogenic oedema (Teissier, 1900; Wassermann, 1933; Luisada and Sarnoff, 1946). Convincing evidence scarcely exists, and I would put forward a plea for a re-examination of the problem.

FIG. 2.—Diagram showing anatomical details of Luisada and Sarnoff's and of Cheng's method of producing pulmonary oedema by intracarotid infusions.

Pulmonary Oedema resulting from Circulatory Failure

Without doubt pulmonary oedema is met with most often in association with some degree of circulatory failure, and standing high in the list of pathological favourites are hypertensive disease, with or without chronic nephritis, advanced mitral stenosis, and obstruction of the coronary vessels (see reviews by Hess, 1932; Frugoni, 1930; Parker and Weiss, 1936; Harrison *et al.*, 1934; Weiss, 1942). Our necropsy records disclosed severe lung oedema in 86% of 94 hypertensive cases, in 68% of 66 cases of complete coronary obstruction, and in 65% of 84 cases of mitral stenosis, an experience which is in agreement with the general run of necropsy findings. In most instances the oedema involves both lungs, and the lower and middle lobes are the sites of election, though we have encountered it in the upper lobes alone or in the "butterfly" or "fan-shaped" perihilar arrangement which is said to be common in uraemic cases (Doniach, 1947).

Like other observers, I have been impressed with the frequent history of dyspnoea, in all these cases, often very severe or paroxysmal immediately before the oedema reached its clinical crisis, and I incline to the view that such respiratory embarrassment plays an important part in the cause of the oedema. But I have been unable to convince myself of a simple mechanical explanation of the circulatory disturbance in the lungs, although I accept the emphasis placed upon failure of the left ventricle. Nevertheless, I have seen an instance of lung oedema where right heart failure seemed to be more important than left. I must confess, however, that I experience great difficulty in sorting out the state of the two ventricles, and am compelled to refer the decision to the clinician and the experimentalist.

For many years we have come under the tyranny of the theory of dissociation of output from the right and left ventricles. This view derived from the demonstration by Friedländer (1873) that compression or ligation of the rabbit's ascending aorta between the heart and the innominate trunk gives sudden massive oedema of the lungs associated with severe stasis. Welch (1878), working in Cohnheim's laboratory, obtained similar results with dogs and rabbits, the latter species being especially inclined towards oedema after compression of the aorta. Under such circumstances the carotid arterial pressure increased but the pulmonary arterial pressure showed little change. Welch showed that nearly all the venous outflow from both lungs must be obstructed before oedema develops and that a large part of the left ventricle and auricle can be shut off by clamping without oedema appearing (Fig. 3). On the other hand, when the wall of the left ventricle of a rabbit is crushed without affecting the right ventricle, pulmonary oedema sets in rapidly, but paralysis of the right ventricle does not produce oedema provided the left ventricle carries on its function normally. From these experiments Welch concluded that disproportion between the mechanical efficiency of the left and right ventricles, provided resistance within the pulmonary vascular bed remains unaltered, leads to oedema, for the left heart is unable to expel in a unit of time the same quantity of blood as the right heart. Despite criticism from time to time, this theory has held the field for seventy years, either in its original form or in a modified version.

FIG. 3.—Diagram of heart and aorta showing sites of obstruction in Welch's experiments.

Scrutiny of Welch's paper shows that he used very few animals, his results were very variable, he gave little information about the extent of the oedema, and he employed artificial respiration with the thorax wide open. Extraordinary degrees of interference with cardiac output were necessary to induce oedema, the most serious grades of which were seen when the animal became unconscious from cerebral ischaemia. Quite recently Dr. Cheng has repeated some of Welch's experiments for me with rabbits, and has experienced much difficulty in obtaining even mild lung oedema by ligating the aorta near the heart. I shall return to Cheng's results a little later. Much of the criticism of Welch's theory has come from investigators who have failed to confirm his results or who could not establish a correlation between pulmonary haemodynamics and the degree of cardiovascular impairment. Part of the trouble originates, I believe, from the grossly abnormal nature of the experiments. It is certainly difficult to justify the conclusions reached by many workers on the evidence they offer (Sahli, 1885; Löwit, 1893; Teissier and Guinard, 1901; Kotowschtschikow, 1913; Coelho and Rocheta, 1933). Some record increased pressure within the left auricle and pulmonary artery after severe aortic obstruction or cardiac compression;

others record little increase or even a fall in pressure. Löwit (1893), for instance, states that prolonged artificial respiration alone can lead to pulmonary oedema in rabbits, yet the pressure in the pulmonary artery, left auricle, and carotid falls, and he concludes that pulmonary stasis is not the cause of ventilation oedema. Löwit suggests that the main factor is increased capillary permeability associated with excessive stretching of the lung capillaries.

Production of acute cardiac failure by injection of necrosing chemicals—e.g., silver nitrate—into the heart muscle of either ventricle (Coelho and Rocheta, 1933; Cataldi, 1937) or by blocking the left coronary artery (Samuelson, 1881; Bettelheim, 1892; Löwit, 1893; Coelho and Rocheta, 1933) has likewise given irregular results. Thus Bettelheim obtained a rise of left auricular pressure, slowing of the heart, and shallow respiration, but no change in pulmonary artery pressure and no pulmonary oedema, when he ligated the left coronary artery of dogs; but success was claimed by other workers. How far such positive results may be applied to the intact animal is uncertain. I cannot help thinking that much of the obscurity comes from technical imperfections: careful experiments such as those of Johnson *et al.* (1937) show that marked sudden changes in systemic blood pressure have but little immediate effect on pulmonary arterial pressure, partly because of the capacity of the pulmonary vessels to increase their blood content very considerably with but little change in pressure, and partly because of compensatory mechanisms which readjust the balance between the lesser and greater circulations. Hence no more than a transitory dissociation of output from the ventricles is conceivable, for just as soon as the pulmonary vessels become engorged automatic regulation of cardiac function occurs with compensation of back pressure. Experiments on obstruction of pulmonary blood flow certainly lead to the conclusion that oedema of the lungs can be produced in this way, but only when a tremendous handicap is placed upon the circulation which brings the organism very near to death. I am forced to the opinion that some other factor may be necessary in addition to a higher head of filtration pressure within the capillaries in order to precipitate an attack of pulmonary oedema. What this is I cannot say, but I feel sure it may act through modifying the permeability of the vessels. Perhaps a moderate degree of anoxia, which alone will not give oedema, may suffice to tip the balance (Warren and Drinker, 1942): a dyspnoeic seizure with a further increase in pulmonary congestion (Fraser *et al.*, 1928; Harrison *et al.*, 1934) and a lowering of subatmospheric intrapleural pressure (Prinzmetal and Kountz, 1935), an attack of bronchitis, or a moderate depletion of the plasma protein leading to diminution of colloidal osmotic pressure of the plasma might well qualify for this category of contributory factors.

Studies on the mechanism of pulmonary oedema using the Starling heart–lung preparation, though of limited application to the problem, afford some support for the views I have put forward. This method has the great advantage of allowing accurate records being made of the blood-flow through the lungs. There is agreement among physiologists who have carried out such experiments that the pulmonary arterial and venous pressures have to be raised very considerably before oedema of the lungs sets in (Modrakowski, 1914), and, conversely, oedema may develop before any rise in pulmonary arterial pressure can be detected (Lambert and Gremels, 1926). Changes in the perfused blood, as when it is stale or after addition of metallic poisons or with dilution of the blood colloids, further the development of oedema, no doubt because of injury to the capillary endothelium (Modrakowski, 1914; Barry, 1923; Lambert and Gremels, 1926). Professor C. Lovatt Evans informs me that contamination of the perfusate with a streptococcus is a potent factor in initiating the lung oedema. A pathological lung becomes oedematous with some ease when perfusing pressure is only slightly raised or venous outflow is impeded. All such observations have their value in the analysis of the problem, but they must not be pushed too far.

Overloading the circulation with massive infusions of fluid or blood is not without risk of pulmonary oedema. Large amounts of physiological saline may be injected intravenously into animals with impunity if the organs of excretion are functioning normally and there is no impairment of the pulmonary circulation and nervous system (Cohnheim and Lichtheim, 1877; Löwit, 1893; Kraus, 1913; Brunn, 1934; Warthen, 1935; Farber, 1940; Gibbon and Gibbon, 1942; Gibbon *et al.*, 1942–3; Luisada and Sarnoff, 1946). After sudden reduction of lung tissue by lobectomy, caution should be exercised in the use of transfusions, and human casualties under these circumstances have been recorded (Gibbon *et al.*, 1942–3). The pulmonary arterial pressure is said to be increased, but the systemic arterial and venous pressures remain unchanged. Further investigation is required before a satisfactory explanation of the oedema can be given.

Miscellaneous Varieties of Pulmonary Oedema

There remain for discussion some examples of pulmonary oedema which are difficult to fit into any classification at the moment because of incomplete knowledge of their nature or the suspicion that several factors are involved in their causation.

Continuous exposure of animals to high concentrations of oxygen leads to pulmonary oedema and pleural effusions (Karsner, 1916; Boycott and Oakley, 1932, 1933). Respiratory symptoms predominate at pressures of 0.8 to 2 atmospheres; nervous symptoms like those of strychnine poisoning appear at levels above these (Behnke, 1942; Stadie *et al.*, 1944). Anoxic features set in as the oedema progresses (Binger *et al.*, 1927), but oedema may be present without clinical signs (Paine *et al.*, 1942). The cause of the oedema is not known, though prolonged constriction of pulmonary vessels may play a part (Retzlaff, 1913; Tannenberg, 1942). Vagal bradycardia is often a feature of oxygen-poisoning—apparently a central nervous effect, for high oxygen concentrations give constriction of the vessels of the brain (Tinel, 1927; Wolff and Lennox, 1930; Cusick *et al.*, 1940). I cannot help wondering whether the oedema is neurogenic in origin, although there is no direct evidence for this view.

Rapid paracentesis is occasionally followed by acute oedema of the lungs, and may be due to blood pouring into the compressed lung, the vessels of which have become more permeable as the result of ischaemia which accompanies pulmonary collapse (Scriba, 1885; Kovacs, 1891; Ortner, 1899). Patchy oedema may accompany pulmonary embolism and is sometimes extensive (Friedländer, 1873; Shaw Dunn, 1919–20). Shaw Dunn showed that dyspnoea is an early feature of severe lung embolism. It is prevented by dividing the vagi, is independent of any alteration in the CO_2 or oxygen content of arterial and venous blood, and is not accompanied by any permanent diminution in the amount of blood which passes through the lungs in unit time. Hence he emphasized the importance of nervous factors in the production of the dyspnoea and the oedema. Another factor may be cardiac, for massive pulmonary embolism in dogs is accompanied by electrocardiographic findings which suggest interference with coronary flow (de Takats *et al.*, 1939), and there is some reason for accepting a close nervous relationship between the pulmonary and coronary circulations (Kauffmann, 1933; Scherf and Schönbrunner, 1937; de Takats and Jesser, 1940; Jarisch, 1940).

The nature of the pulmonary oedema which develops in rabbits when adrenaline is administered in large doses by the intravenous, subcutaneous, or intratracheal routes still remains obscure (Meltzer, 1904; Josué and Bloch, 1908; Auer and Gates, 1917; Luisada, 1928; Boggian, 1929).

1. Adrenaline increases peripheral resistance, which leads to a rise in systemic pressure, a partial failure of the left heart, and irregularity in cardiac action. A rise of pulmonary pressure has been claimed (Schafer and Lim, 1919) and refuted (Johnson *et al.*, 1937); but no great load is placed upon the right heart, because of the capacity of the pulmonary bed to increase its blood content (cf. Hamilton, 1932; Hochrein and Matthes, 1932, 1933).

2. A direct action of adrenaline on the pulmonary vessels, generally resulting in vasoconstriction but sometimes in vasodilatation, has been demonstrated in the perfused lungs of dogs (Cloetta and Anderes, 1914; Cloetta and Stäubli, 1919; Berry and Daly, 1931; Gaddum and Holtz, 1933; Daly *et al.*, 1940). Pulmonary arterial pressure increases and venous outflow may be augmented. How far these results are applicable to the intact animal is not known.

3. Adrenaline oedema is slight when the animal is kept alive by means of artificial respiration with the chest open and the vagi are divided (Auer and Gates, 1917; Wichels and Lauber, 1932). It

can be prevented by morphine and drugs, such as chloral hydrate, which act on the higher centres of the brain (Luisada, 1928), by injuring the mid-brain (Glass, 1928), and by division of the cervical spine (Luisada, 1928), though not by puncture of the cerebrum or thalamus or removal of the cerebrum. Respiratory stimulants favour the development of oedema (Luisada, 1928). These observations suggest that both cardiovascular and nervous factors are concerned in the oedema mechanism; but the problem needs reinvestigation with modern appliances. An adrenal factor has been claimed for the pulmonary oedema recorded from time to time with suprarenal tumours of the chromaffin type (Kolisko, 1913; Labbé *et al.*, 1922; Biebl and Wichels, 1925; Paul, 1931) and even with the oedema of cerebral trauma, but no convincing evidence in support of such suggestions is forthcoming.

A Unifying Principle

It must be apparent from these remarks that many gaps still exist in our knowledge of pulmonary oedema. In certain cases we are much better informed about the mechanisms concerned than in others. This is especially so with the oedema resulting from irritant gases and chemicals, in which there is no reason to suspect primary disturbance of the circulation in the lungs, the outpouring of fluid being referable to leakiness of the capillaries and failure of the lymphatics to remove the exuded plasma. With neurogenic and circulatory oedema we appear to be faced by more subtle conditions, and we are still unable to analyse these with precision. I believe it is possible to simplify the problem by paying some attention to the composition of the oedema fluid, and for that reason I asked Dr. Cheng to repeat a number of the recorded experiments with the object of estimating the protein content of the lung exudate. With care, this fluid can be obtained from the bronchi by aspiration in a state similar to that in which it exists within the air spaces.

Cheng's results are summarized in Table III. They show that the most divergent modes of production give a fluid with a high protein concentration. Not infrequently this

TABLE III.—*Protein Content of Oedema Fluid from Lungs (K. K. Cheng)*

Method of Producing Lung Oedema	Animal	Protein Content of Oedema Fluid (G. %)		
		Total	Albumin	Globulin
I. Methyl salicylate intravenously	Rabbit	7·62	3·40	4·22
II. Adrenaline intravenously ..	Rat	5·20	3·0	2·20
III. Oxygen-poisoning for 5 days	Guinea-pig	4·25	2·75	1·50
IV. Injection of fibrin into cisternae —neurogenic	Rabbit	5·50	4·0	1·50
	Rat	4·68	2·40	2·28
V. Infusion of saline into carotids	Rabbit	1·25	0·93	0·32
VI. Ligation of aorta proximal to left subclavian artery with ligation of both carotids	"	5·30		

approaches the protein level of plasma. Even in the experiments where large quantities of normal saline were suddenly introduced into the arteries the protein concentration exceeded 1%, and it seems quite likely some of the injected saline was responsible for the lower level. Clearly we are concerned with a disturbance of capillary permeability in all such diverse instances of pulmonary oedema. Here is a unifying principle for future investigation. It must be our task to decide whether permeability of endothelium is controlled by nervous influences, as would seem to be the case in the experiments on neurogenic oedema; how far permeability can be modified by alteration of blood flow through the capillaries; and, above all, the mode of action of environmental variations, especially gaseous exchange. These problems are not peculiar to the lungs; they are restatements of the fundamental questions which puzzle us in fluid exchange throughout the organism. Armed with this simple conclusion from our discussion, we must return to the wards and the laboratories for further action.

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Air transport and packing in dry ice were recently used for the first time to convey dried cultures of *Staph. pyogenes* in glass ampoules and bacteriophage in fluid from the Central Public Health Laboratories in London to Sydney, Australia, whence they were delivered to Miss Nancy Atkinson, bacteriologist at the Institute of Medical and Veterinary Science, Adelaide. B.O.A.C. staff renewed the ice at Lydda, Calcutta, Singapore, and Sydney. The journey took about four days.

A NEW CONCEPTION OF ANGINA PECTORIS

BY

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Before considering angina pectoris it is necessary to recall certain physiological facts about the course of the vasodilator and protopathic pain fibres. The vasodilator fibres to both the somatic and the visceral organs do not run in the parasympathetic system, nor do they relay in the various sympathetic ganglia in the body. Apart from a few fibres in the parasympathetic system the only known vasodilator fibres are those of unmyelinated type running in the posterior and trigeminal nerve roots and having their cell bodies in the corresponding ganglia. Thus stimulation of the peripheral ends of the posterior nerve roots produces vasodilatation in the corresponding dermatome and also in the deep tissues and viscera, and herpes zoster in the skin. Moreover, providing the sino-aortic nerves are intact, the raising of the blood pressure in the carotid artery or aorta in a sympathectomized animal still produces a normal reflex vasodilatation in other parts of the body (Bayliss, 1901, 1902). Lewis (1927) further showed that if the posterior roots are cut distal to their ganglia and their peripheral ends allowed to degenerate, the arterial "flare" of the "triple response" in the skin fails to occur after the application of noxious stimuli. This reactive hyperaemia occurs in all tissues when injured or stimulated (Lovén reflex).

The whole of the sympathetic system may be removed and yet reflex vasodilatation will still occur in response to a stimulus to a tissue. A stimulus or injury to any tissue, including anoxia, must therefore result in a reflex activity in the unmyelinated posterior root vasodilator nerve fibres. These are, of course, the same fibres which conduct protopathic pain impulses, and are cholinergic in type. Such pain fibres supply the visceral and somatic blood vessels and run in the posterior nerve roots (Moore and Singleton, 1933). They are evidently the vasodilator fibres of these vessels. It has now been shown that an excessive arterial vasodilatation results in the experience of protopathic pain. This is seen, for example, during a migrainous attack and in cases of erythromelalgia. In the former, hanging the head down, which normally causes arterial vasodilatation, will also greatly exaggerate the pain. In the latter condition the affected limb exhibits arterial vasodilatation and is painful. Dependence of the limb increases both the vasodilatation and the pain, while elevation has the opposite effect. Thus the passage of excessive numbers of impulses in vasodilator fibres results in painful experiences.

Very many theories regarding the cause of anginal pain have been put forward. Allbutt (1915) championed the tambour theory, which supposed the pain to be due to bulging of the suprasigmoid portion of the mediastinum. This theory has been discarded, and it is now fashionable to ascribe all anginal pain to ischaemia of the cardiac muscle, due either to coronary arterial disease, anoxia, or anaemia, or to a low pulse pressure and so diminished flow in the coronary vessels. Anoxia is thought to cause the accumulation of metabolites, such as the P factor of Lewis (1931), which stimulate the nerve endings lying on the coronary vessels. Yet in some cases there is no evidence of coronary disease, anoxia, anaemia, or low pulse pressure, and it is then usual to invoke the hypothetical phenomenon of spasm in the coronary vessels to account for the anoxia thought to produce pain. There are many reasons to doubt that ischaemia or anoxia is always the cause of angina from cardiovascular disease. For example, severe coronary

disease and even complete occlusion of a large coronary vessel may be quite painless. Some other factor must exist to account for the occurrence of pain in some cases and not in others.

Anginal Pain and Normal Heart

There have gradually accumulated many accounts of patients with typical anginal pain from disease of tissues in the neighbourhood of the heart and in whom the heart is normal. These include:

Acute Mediastinitis or Mediastinal Abscess.—This results in severe pain substernally and between the shoulder-blades, and it may also pass down the arms and into the neck. Allbutt described a case of tuberculous mediastino-pericarditis with such symptoms.

Mediastinal Tumours.—These may cause pain substernally, between the shoulder-blades, and passing into the arms. It may be constant, intermittent, or paroxysmal (French, 1924).

Pneumo-mediastinum.—The presence of air in the mediastinum may cause temporary and often paroxysmal excruciating substernal pain passing into the arms, neck, jaws, and teeth (Scott, 1937).

Para-oesophageal Hernia of Stomach into the Mediastinum.—Roesler (1939) states that this may cause typical angina. An example of this is the following case.

Case 1.—A woman aged 57 attended the Royal Cancer Hospital under the care of Dr. P. E. T. Hancock on Nov. 18, 1947. Two years previously within a few days she had developed epigastric and substernal pain passing to the interscapular region and into both arms, especially the left. The pain came on about a quarter of an hour after meals, lasted about an hour, and was sometimes accompanied by vomiting. In addition she had periodic attacks of numbness and tingling in one or other digit of the left hand quite apart from the anginal attacks. The pain disappeared after two months, but had returned a month before attendance. Its features were the same as during the previous attack. It was of considerable severity and made her afraid to eat. Three weeks previously she had vomited a small amount of "coffee-grounds" material. Her appetite had disappeared and she had lost 7–8 lb. (3.17–3.62 kg.) in weight. On examination, apart from some slight tenderness on palpation in the middle of the epigastrium, no abnormal physical signs were to be made out. The blood pressure was 140/80 mm. Hg. No abnormal degree of peripheral arteriosclerosis was present and the cardiac apex beat was not displaced. The electrocardiogram was normal. A barium meal, however, showed the presence of a para-oesophageal hernia of the fundus of the stomach into the mediastinum to the left of the cardia. A fractional test meal revealed hypochlorhydria. The blood count showed: red cells, 4,040,000 per c.mm.; Hb, 62%; C.I., 0.77. She was treated under an ordinary peptic ulcer regime, including 10 minims (0.6 ml.) of tincture of belladonna half an hour before meals. Within two months her symptoms had completely disappeared and she had regained her former weight. A second barium meal showed no change in the radiological appearances.

Partial or Complete Oesophageal Rupture Within the Mediastinum.—Jackson and Jackson (1935–6) report that this causes typical angina. Mere distension of the oesophagus may have a similar effect.

A Dissecting Aneurysm of the Aorta in the Mediastinum.—While the dissection is taking place typical anginal pain may occur (Allbutt, 1915).

Spontaneous or Artificial Pneumothorax.—Anginal pain resulting from spontaneous pneumothorax has been described by Ontaneda *et al.* (1937) and from artificial pneumothorax by Lord (1925), Ballon and Francis (1929), Hamman (1934), and others. Obviously a unilateral pneumothorax may cause considerable displacement of the mediastinum when the latter is slack.

Pneumonia.—Anginal pain may occur during an attack of pneumonia (Kelman, 1919, Wassermann, 1920). In this illness the mediastinum may either be displaced or be the seat of glandular enlargement and inflammation.

Aneurysmal Dilatation of the Pulmonary Artery.—Anginal pain resulting from such a lesion has been described by Henschen (1906), Bedford (1929), and others. The disease may occur in comparatively young people, when it is often congenital in nature and unaccompanied by anoxia. The coronary vessels may then be completely normal and there is no question of involvement of their ostia by disease. The pulmonary artery lies within the mediastinum, and during its enlargement presses on the mediastinal tissues.

Aneurysmal Dilatation of the Aorta.—Angina is very commonly associated with such a lesion even in the absence of any evidence of aortic insufficiency. It is usually attributed to coexisting coronary disease or to involvement of the ostia of the coronary arteries by the aneurysm or a syphilitic process. The electrocardiogram may show no evidence of myocardial disease. The mediastinal structures are always disturbed, however. Mechanical distension of the aorta in dogs failed to give rise to anginal pain (Sutton and Lueth, 1930), though this developed when the periaortic tissues were damaged. It seems probable, therefore, that disease of the artery wall itself is not responsible for the anginal pain, but that pressure on periaortic structures is important.

Diaphragmatic Flutter.—This may give rise to paroxysmal anginal pain passing to the arms (Winkler, 1933; Hofbauer, 1933; Porter, 1936). The electrocardiogram may be normal between the attacks but show an inverted T wave during them.

Pressure on the Diaphragm by Distension of the Stomach or Colon with Gas.—This may cause anginal pain localized to the left chest and arm (Lurjé and Stern, 1931; and others). It may perhaps displace the mediastinum.

Disease of the Gall-bladder.—This not uncommonly causes typical anginal pain, which may disappear when the gall-bladder is removed.

There is interference with the aeration of the blood in the lungs in many of the above conditions, as in cases of pneumonia or pneumothorax. A tuberculous mediastinal abscess is usually secondary to lung disease. A mediastinal tumour or an aneurysm may likewise cause collapse of a portion of the lung. Yet the complete lung on one side may be removed without causing angina. Moreover, in such conditions as pneumomediastinum, para-oesophageal hernia of the stomach, aneurysmal dilatation of the pulmonary artery, disease of the gall-bladder, or mediastinitis there is no suggestion of anoxia or of disturbance of the coronary arteries. In all the above conditions there is either disturbance of the mediastinal connective tissue by inflammation, pressure of one of the contained tubes or a gastric hernia, or displacement due to unilateral pressure of air in the pleural cavity, or there is disease of the diaphragm and the gall-bladder. Embryologically the connective tissue of the mediastinum, diaphragm, and gall-bladder all originate from the septum transversum. All such mechanical or inflammatory lesions cause a reflex arterial hyperaemia in the affected tissues. This means increased numbers of impulses in the appropriate vasodilator pain fibres in the posterior roots.

Other Causes of Anginal Pain

Apart from the above causes anginal pain may result from coronary sclerosis. It may also accompany hypertension (whether essential or renal in type or due to adrenal medullary or cortical tumours), aortic regurgitation or stenosis, mitral stenosis, and paroxysmal auricular fibrillation or tachycardia (see King, 1941; White, 1944). In such conditions the pain is usually brought on by physical exertion, flatulence, a heavy meal, or emotional upset. It may tend to occur during sleep. It is sometimes accompanied by flushing, and is occasionally followed by the appearance of herpes zoster in the segmental areas affected by the pain (see White, 1944). Anginal pain may also result from coronary thrombosis, acute cor pulmonale due to pulmonary infarction, cardiac trauma, the tearing of a papillary

muscle (Todd, 1848; Glendy and White, 1936; Payne and Hardy, 1937), acute toxic myocarditis, hydatid infestation of the heart (Evans, 1832), metastatic tumours of the myocardium (King, 1941), abscess of the heart, and many other inflammatory states of the myocardium. Such pain may also result from general disturbances, such as anoxia, anaemia, exposure to carbon monoxide, trichlorethylene ("trilene"), pentnucleotide, and nicotine, hyperinsulinism, Graves's disease, the injection of adrenaline, or anxiety states. It may constitute a tabetic crisis or occur as a withdrawal symptom in morphine or cocaine addicts.

The coronary vessels are surrounded by unmyelinated fibres, which accompany them to the various tissues of the heart. Some of these fibres must conduct vasodilator impulses. It is well known that the exposed heart is insensitive to painful stimuli. Sutton and Lueth (1930) showed that cutting, piercing, tearing, or pinching the myocardium or distension of the ventricle did not give rise to pain. On the other hand, tightening a ligature around the coronary vessels resulted in pain referred to a limb. Such a ligature included the unmyelinated fibres lying on the coronary vessels. Painting the vessel proximal to the ligature with 80% alcohol before this procedure prevented the onset of pain.

Gorham (1943) showed that tension on the coronary vessels may cause cardiac pain without producing any electrocardiographic signs of ischaemia. This suggests that the impulses giving rise to pain originate in the walls of the coronary arteries. By analogy with other blood vessels it would be expected that cardiac pain would result from excessive activity in coronary vasodilator fibres running in the posterior nerve roots. This is confirmed by the following observations.

1. Anginal pain is abolished by section or blocking of vasodilator pain fibres of D 1–4 (5) on the corresponding side.

2. A lesion of any tissue of the body, including the heart, leads to local arterial vasodilatation, whether the lesion is due to infarction, trauma, or an infective agent. Exposure of an organ to anoxia, anaemia, or carbon monoxide has the same effect. This vasodilatation results from increased activity in the vasodilator pain fibres. When the agents affect somatic tissues pain results. When they cause dilatation of the pial and cerebral vessels a headache may appear. When they affect the heart they may cause angina. Thus infarction often leads to anginal pain and changes in the electrocardiogram. Trauma to the heart may likewise cause anginal pain and changes in the electrocardiogram similar to those of coronary thrombosis (King, 1941). Anoxia, anaemia, or carbon monoxide poisoning may have the same effects. Rupture of a papillary muscle which is followed by inflammation and vasodilatation leads to severe angina. Acute toxic myocarditis is accompanied by pronounced coronary vasodilatation and often substernal anginal pain. Bacterial and other infections and hydatid infestation involving the heart may also cause angina (King, 1941). In all these anginal states there occurs a transient or permanent coronary arterial vasodilatation. After infarction this is maximal in the first few hours, and it is at this time that the anginal pain is at its height.

3, A rise in blood pressure increases the work of the heart and so results in vasodilatation in the coronary vessels. It also produces a reflex vasodilatation throughout the body by way of the sino-aortic nerves. This is shown by the high colour of the skin of many hypertensives. The vasodilatation in the pial and cerebral vessels causes headache. This generalized vasodilator activity must augment the increased activity in the coronary vasodilator fibres caused by increased work. In such conditions of hypertension angina is common.

4. In tabes there is destruction of the pain fibres in the posterior nerve roots. A tabetic crisis is painful and is accompanied by vasodilatation in the affected organ or tissue. It may be followed by small haemorrhages. In some cases such a crisis may take the form of an anginal attack.

5. During the withdrawal of drugs from morphine and cocaine addicts there is a general vasodilatation in all organs, and angina pectoris frequently occurs.

6. An anginal attack often occurs in sleep when there is a general vasodilatation in the skin and other organs.

7. A heavy meal causes vasodilatation in the stomach and neighbouring tissues. It may induce an anginal attack in a subject of the disease.

8. An anginal attack may be accompanied by flushing of the face and upper part of the body—evidence of increased activity in vasodilator fibres.

9. Emotion often causes vasodilatation in tissues, and may induce an anginal attack in a subject of the disease or in one with a normal heart.

10. The injection of insulin not infrequently causes flushing of the skin and sweating (both signs of activity in cholinergic fibres), and one of its early effects is to produce increased gastric peristalsis, which is abolished by the application of atropine (Best and Taylor, 1943), and is thus due to activity in cholinergic nerve fibres. At the same time it often produces a migrainous or other type of headache. The hormone evidently stimulates cholinergic, including vasodilator, fibres. Not uncommonly it may induce an anginal attack, even in a person not normally subject to them.

11. In cases of Graves's disease there is increased activity of the heart, but also a notable vasodilatation in the tissues of the upper half of the body involving the mediastinum as well as the skin. Angina may occur on effort.

12. Nicotine likewise produces a general vasodilatation and not uncommonly headache. It is a well-known cause of anginal attacks.

13. Trichlorethylene, like other anaesthetics, causes general vasodilatation. It may induce angina, suggesting that the latter is due to excessive activity in vasodilator pain fibres.

14. In a case observed by me the intravenous injection of pentose nucleotide, a powerful vasodilator, into a patient with no sign of cardiac disease produced a typical attack of angina.

15. A coronary thrombosis with anginal pain may be followed by herpes zoster in the areas where the pain is felt. This indicates increased activity in vasodilator root fibres.

16. An attack of brachial radiculitis in a subject with no evidence of heart disease may cause angina of effort, which disappears when the radiculitis clears up. Such cases have been described by Nachlas (1934), Josey and Murphey (1946), and others. An example which I saw in the recent epidemic of brachial neuritis is here described.

Case 2.—An Army officer aged 26 was seen on Feb. 26, 1943. Three months before, while sleeping under canvas and exposed to damp, he developed severe aching and stiffness in the neck. His regimental medical officer diagnosed rheumatic torticollis. After heat and massage treatment in the next month the aching spread to the shoulders and down both arms, especially the left. The pain was particularly severe at night and kept him awake. On rising there occurred stiffness, redness, and swelling of the hands and neck, and crepitations in the shoulder-joints. The finger-tips tingled and felt numb. The arms felt weak and ached, especially after use. The symptoms persisted in spite of the heat and massage treatment. Three weeks before being seen he began to experience great distress on walking only 80 yards (73 metres) at an ordinary pace. This was accompanied by a constricted feeling round the upper thorax and a feeling of pressure under the upper sternum with pain, which passed down the inner side of both arms to the fourth and fifth fingers, especially on the left side. The pain was accompanied by a burning, tingling sensation in these fingers. The symptoms caused the patient to stop walking and would then pass off within about half a minute, though the burning and tingling in the fingers persisted considerably longer.

Examination showed a marked tenderness on pressure over the cervical and brachial nerve roots, which felt thickened. Pressure produced a tingling sensation in the fingers, which were somewhat swollen, with thickening of the interphalangeal joints. The hands and forearms were reddened and hot.

Power in the upper limbs was normal and there were no changes in the tendon reflexes. There was a marked hyperalgesia in the skin of the upper limbs and a distaste for handling of the limbs. No sensory loss could be made out. Crepitations were present on movement of both shoulder-joints. The drawing of a pin along the skin of the forearms and back of the hands produced an intensely disagreeable sensation and a gross exaggeration of the "flare" of the "triple response," which persisted for over an hour. In other parts of the body this procedure produced only a normal flare. A radiograph of the heart and cervical spine showed no abnormality, and an electrocardiogram was normal. The blood pressure was 120/80 mm. Hg and the pulse regular.

The patient was advised to rest in bed lying flat with the arms in slings, and acetyl-salicylic acid, 10 gr. (0.65 g.), was given three times a day. After a month the pains and the anginal symptoms had disappeared, though the hands were still swollen on waking in the morning. After a further month, using the limbs as little as possible, there was still slight swelling of the hands on waking. When seen a year later his symptoms had completely disappeared.

In this case there was no evidence of coronary disease, but the arm was painful and hot, and its tissues showed marked vasodilatation. The flare of the triple response was very easily obtained on the affected skin. This vasodilator nervous activity must involve deep tissues supplied by the affected roots and D 1–2 roots, supplying the coronary vessels.

Conclusion

In all cardiac conditions in which angina or coronary pain is experienced there is evidence of excessive activity in the vasodilator pain fibres passing to the coronary vessels, and this is evidently the origin of the anginal pain. Lesions of the derivatives of the septum transversum have also been shown to cause angina. Their nerve supply from the posterior nerve roots is established very early in development, and the nerve supply of the derivatives is therefore closely related if not identical. The mediastinal tissues are supplied with vasodilator fibres by way of D 1–5 posterior nerve roots, which also supply the heart. Lesions of these, as of other tissues, result in an increased activity in the vasodilator fibres passing in the same nerve roots as supply the coronary vessels. Hence any lesion of either mediastinum or heart which causes an increased activity in vasodilator pain fibres may result in angina. Such a conception brings angina into line with other painful conditions, such as headache, resulting from excessive vasodilatation in blood vessels. Thus angina is not directly due to anoxia or to vasoconstriction but to excessive attempts at vasodilatation.

The activity of any organ, including the heart, is accompanied by a reflex hyperaemia and by arterial vasodilatation, which occurs through the agency of vasodilator nervous impulses. The afferent nerve endings are stimulated by metabolites. Coronary sclerosis prevents vasodilatation during increased cardiac activity and allows the collection of metabolites. These cause excessive numbers of reflex impulses in the coronary vasodilator pain fibres in an attempt to produce further vasodilatation, and it is this excessive nervous activity which appears to give rise to the pain in such conditions.

Summary

Evidence is adduced to show that anginal pain may be caused by disease of both the tissues of the mediastinum and the heart. It seems to be due to excessive activity in the vasodilator pain fibres in the posterior nerve roots passing to the mediastinal structures and the coronary vessels, and it is not necessarily due to anoxia.

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TOLERANCE LIMITS TO RADIANT HEAT

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Radiant heat, a combination of visible and infra-red radiations, plays an important part in the practice of physiotherapy. In spite of this widespread use there have been few studies on the optimal and curative effects of measured amounts of radiant heat. The usual method of regulating the dosage of radiant heat is briefly to adjust the source used (incandescent filament bulb or resistance-wire heating element) at a distance from the patient's skin so that he feels comfortably warm but will be free from any hazard of burn. Since the conditions under which a burn will occur are poorly defined, it is necessary always to err on the side of safety.

It is perhaps not generally realized that heat is more easily administered by radiation than by convection and that accurate dosage can be prescribed (Evans and Mendelssohn, 1945a). A series of investigations carried out in this department and at the Clarendon Laboratory, Oxford, have led to the development of a suitable instrument for measuring radiation flux, including all visible and infra-red radiation (Evans and Mendelssohn, 1944, 1945b). The aim of the present investigation was to use this thermo-radiometer for the determination of tolerance limits of the

human skin to heat radiation. In order to isolate the basic problem we have so far limited ourselves to the local application of radiation from an incandescent filament lamp, and to the effect produced on healthy volunteers. Establishment of such a normal tolerance limit will form a base-line on which the clinical applications can be established.

Method

Tolerance limits were determined by exposing a given area of skin surface for a measured time to a radiation flux determined by the subjective reactions and by the skin surface temperature. At the end of each test the radiation flux tolerated under these standard conditions was measured by the thermo-radiometer.

The skin locations chosen were areas of 12 × 12 cm. in the epigastrium and in the interscapular area. Each was exposed to an ordinary clinical radiation source (1,000-watt tungsten-filament bulb set in a concave reflector) operated at constant full strength. Energy profiles were plotted to examine the radiation flux in detail, and these showed a fairly even distribution of radiation flux over the exposed area.*

With the exposure of an area of measured size the input could be calculated from the thermo-radiometer reading in quantitative physical units and an accurate estimate of the dosage obtained. A screen was constructed of asbestos board (insulating layer) with copper sheeting on top (reflecting layer), in the centre of which a square aperture of 12 × 12 cm. was cut. This screen was placed almost in contact with the subject's skin, and so determined the area exposed. An area of this size was chosen as it was found that with smaller areas (4 × 4 cm. and less) the radiation flux tolerated depended inversely on the size of the area. An area such as used in this work also more closely approximated conditions in clinical practice.

The epigastric and interscapular areas were chosen as they provided large relatively flat skin surfaces. Because the skin in these two areas differs in thickness, adiposity, and sensitivity, it was to be expected that in comparing these areas any differences in tolerance limits due to these factors would be thereby discovered. Separate experiments were carried out on various parts of the body. These showed that the variation was slight and would not alter the general conditions as given below. A detailed report will be published later.

The thermo-radiometer used was that described by Evans and Mendelssohn (1945b). It has been designed to measure *all* the visible and infra-red radiation. At the end of each test exposure the thermo-radiometer was put under the screen aperture in the place occupied by the subject's skin and the radiation flux measured, the lamp and screen being in the same relation as during the test. The radiation flux was recorded in gramme-calories per square centimetre per minute, termed by us, for simplicity, "pyrons" (1 pyron = 1 gramme-calorie flowing through 1 square centimetre in 1 minute).

Skin Temperature

As it was thought that there might be variations in tolerance due to apprehension or, on the other hand, due to attempts to stand more heat than others, the skin surface temperature was measured at intervals of a minute during all exposures. It was found in preliminary experiments that under standard conditions of exposure, the skin surface reached a higher temperature than the lower skin layers, the subcutaneous tissues, or the underlying muscles. The skin surface temperature would then be the determining factor in tolerance-limits tests, and one of the most important factors to measure.

After testing several types, the skin thermometer selected consisted of fine copper and constantan wires threaded through a hypodermic needle and soldered together at the tip to form a thermo-junction. This is the method used by Mendelssohn and Rossiter (1944), who have discussed the accuracy and reliability of such a device, with a difference, however, that in our main investigation the tip of the needle was not inserted into the skin but laid on it without exerting pressure. Comparison tests with other types of thermometer showed that in this way skin temperature would be reliably recorded even in the presence of impinging radiation. The leads from the thermocouple were connected in circuit to a galvanometer and to a constant temperature reference junction maintained at 37° C.

With given exposure of radiant heat the skin surface temperature was found to rise rapidly for the first three to five minutes and then to reach a constant temperature—an equilibrium skin temperature at which heat inflow was balanced by heat dissipation (conduction, vasodilatation, and perspiration). The exposure was continued until the skin had continued at equilibrium temperature for ten minutes. This was long enough for the subject to be certain he could tolerate the radiation comfortably. It had been found in preliminary tests that if a certain radiation flux could be tolerated for this length of time it could be tolerated for longer periods, up to 20 or 25 minutes and probably longer. In measuring skin temperatures it was essential to avoid causing air currents to move over the field of exposure. Draughts were excluded from the room, and talking or the moving of objects close to the field of exposure was avoided.

Definition of Tolerance Limits

For the purpose of this investigation the tolerance limit to radiant heat was defined subjectively as the maximal amount that could be tolerated with comfort. In the testing this involved gradually approaching the intensity level of discomfort with slight prickling or mild burning sensation, and then reducing the intensity until the subject was quite certain that the radiant heat was tolerable without discomfort. The equilibrium skin temperature was then observed for ten minutes and the mean value calculated. Variations of equilibrium temperatures from the mean were very small. The thermo-radiometer gave the corresponding intensity of the radiation flux at the end of the exposure, and this, with the mean equilibrium skin temperature, was used to define the tolerance limit objectively.

The effects of this dosage of radiant heat on temperature, pulse, respiration, and blood pressure were measured, as it was considered that changes in these physiological factors might influence tolerance. However, the only significant change was a slight rise in oral temperature (average of 0.6° F. (0.33° C.) in 30 of 38 subjects tested), and it was concluded that these factors were unimportant in defining tolerance limits under our conditions of exposure. Any small effect of heating on the pulse, respiration, and blood pressure was obscured by the effect of rest and diminished apprehension as the test proceeded. The test procedure, including the two exposures to radiant heat of about 15 minutes' duration, was carried out on 40 healthy adult volunteers of both sexes. The observations on skin temperature and radiation flux at tolerance limits are presented below.

*We are indebted to Hanovia, Ltd., for the loan of a "Sollux" heat lamp used in this investigation. The reflector of this lamp has a slightly granular finish which in comparison with most treatment lamps has the great advantage of not producing focused "hot spots." This was of particular value in our investigation, since the tolerance depends on the maximum radiation flux anywhere in the field of exposure. Treatment lamps with radiation field containing hot spots are bound to be inefficient, as the distance between lamp and patient will be determined by the warmest area of the field.

Some of the beneficial effects of radiant heat are thought to be due to an analgesic action. It was hoped that this might be subject to direct experiment by comparing the sensitivity to series of pin-pricks of the area during exposure to radiant heat with that of a control area previously reported as equivalent in sensitivity. Of 39 subjects tested in this way, 29 reported that pin-prick felt duller over the exposure area. Of the remainder only one subject reported that pin-prick was sharper over the exposed area, while nine could detect no difference. Though this is a rather gross and approximate method of testing, it was believed to indicate that heat had a definite blunting effect on pain sensibility. This did not spread to areas with similar nerve supply, under these conditions at least, and thus would appear to be an effect on peripheral nerve endings.

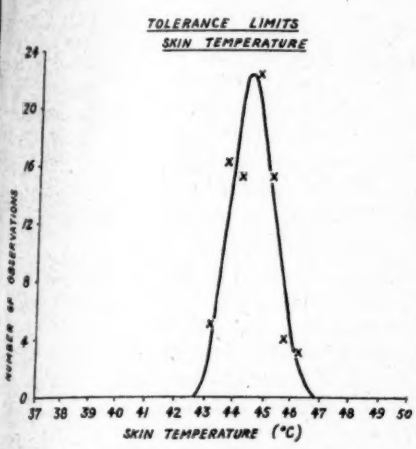

FIG. 1.—Skin surface temperatures at tolerance limits for combined series (80 observations) arranged in 0.5° C. groups, and plotted as a distribution curve. The peak of the curve is seen to occur at about 44.5° C., and the scatter is small.

The measurements of tolerance limits, expressed in terms of the equilibrium skin temperature and radiation flux, showed a surprising uniformity. In fact our results indicate the presence of a well-defined *general* tolerance level in normal subjects. The observations have been presented as distribution curves, Fig. 1 showing skin temperatures (° C.) at tolerance limits, and Fig. 2 showing radiation flux in pyrons. The main equilibrium skin temperature at tolerance limit for the whole series of 80 observations was 44.6° C. (Fig. 1), with a standard deviation of 0.7° C. (extreme range 43.2° C. to 46.4° C.). Thus two-thirds of the observations fell within a range of only 1.4° C.

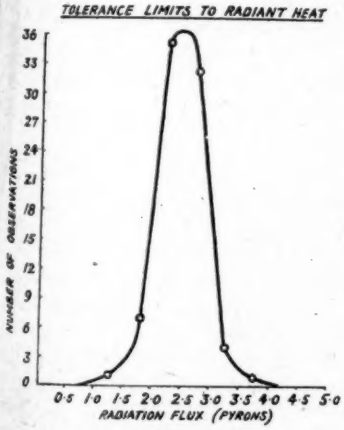

FIG. 2.—Data for radiation flux at tolerance limits for combined series (80 observations) arranged in 0.5 pyron groups, and plotted as a distribution curve. The peak of the curve is seen to occur at about 2.4 pyrons, and the scatter is small.

The mean radiation flux tolerated for the series was 2.4 pyrons (Fig. 2), with a standard deviation of 0.4; thus two-thirds of the observations fell within a range of 0.8 pyron.

In each subject, too, there was a remarkable preciseness with which the tolerance level could be defined. As a routine the lamp was raised and lowered several times before the final level of maximum radiation with comfort was decided, and each time the subject stated his tolerance to be at an almost identical level, although it was difficult or impossible for him to judge visually the distance of the lamp from the skin.

The difference in tolerance limits between the epigastrium and the interscapular area was small though statistically significant. The mean values of the observations on the epigastrium were 44.3° C. and 2.3 pyrons compared with 44.9° C. and 2.6 pyrons for the interscapular area (see Figs. 3 and 4). A difference of this small degree, when viewed in the light of clinical practice, would not necessitate separate dosage schedules for these areas. However, a significant difference does indicate that differences in skin structure or function, such as thickness, adiposity, pigmentation, richness of sweat glands and of nerve endings, may influence tolerance limits even though only in a small degree. The exact influence of these factors remains to be determined.

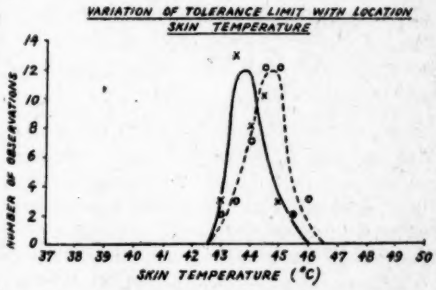

FIG. 3.—Separate distribution curves plotted for skin temperatures at tolerance limits for epigastric (continuous line) and interscapular (broken line) areas under standardized conditions. A statistically significant though small variation occurs between these two distributions.

These findings are interesting when compared with previous reports. Carl Sonne (1929) studied the tolerance of five subjects to visible and short infra-red radiation for an exposure area of 3 cm. diameter on the inner side of the forearm, and found a value of 3.1 pyrons. Laurens and Foster (1937), in a study of the tissue temperature gradient under radiant heat, found that most of their subjects could tolerate 1.8 pyrons from an incandescent source, but they do not state that this was the maximum tolerable. Mayneord and Tulley (1943), using a different type of thermo-radiometer, in a series of 25 patients undergoing heat treatment found that there was a wide range of radiation intensities tolerable from 0.6 to 3.6 pyrons, but most values were about 2 pyrons. The skin temperatures were not reported. Elkins and Sheard (1941) found that, with a 250-watt heat lamp, skin temperature of 41–43° C. over the foot and knee could be tolerated without discomfort, but the radiation intensities were not specified.

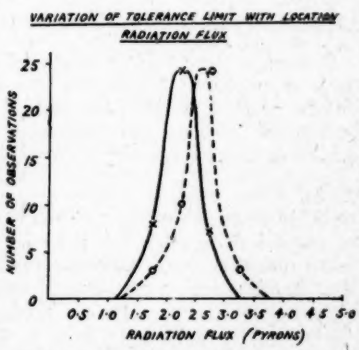

FIG. 4.—Separate distribution curves plotted for data of radiation flux at tolerance limits for epigastric (continuous line) and interscapular (broken line) areas. Again a statistically significant though small variation occurs between these two distributions.

The present findings indicate that a fairly definite tolerance limit may be determined for normal subjects under standard conditions. With such a definite value as a guide, conclusions may be drawn regarding approximate dosage levels in clinical practice. Directions for treatment intensities as given in some textbooks of physiotherapy would probably produce incident radiation flux of less than 1 pyron (Krusen, 1941; and Kovacs, 1945). A few measurements were carried out on patients undergoing clinical treatment, and the radiation flux varied from 0.75 to 1.5 pyrons. Probably the present dosage of radiant heat is inadequate (Elkins, 1946) and could be increased with

considerable advantage under carefully controlled conditions such as the measurement of radiation flux with the thermo-radiometer and of skin temperature. In similar fashion, tolerance limits for various pathological conditions in which the tolerance is likely to be reduced (peripheral vascular disorders, nerve lesions, large avascular scars) could be defined, and appropriate conditions established (including dosage in measured quantitative units) for radiant-heat therapy in a wide variety of diseases.

Summary

The tolerance limit to local irradiation by visible and infra-red rays has been measured in terms of radiation flux and skin temperature in 40 experimental volunteers.

There is a sharp and well-defined transition from a feeling of heat which is comfortable to a sensation of burning. The skin temperature at which this change of sensation takes place is about 45° C. (113° F.) and the tolerated radiation is of the order of 2.5 gramme-calories per square centimetre per minute. This figure is well above the usual therapeutic intensity, and we suggest that under well-defined conditions considerably higher intensities of radiant heat can be applied clinically than has been customary so far.

We should like to thank Prof. L. J. Witts for his suggestions and advice in all phases of this work. We are much indebted to Miss MacDonald, of the Dorset House School of Occupational Therapy, and to the students at the school who were such willing volunteers. Mrs. Lloyd-Smith greatly assisted in recording the experimental work.

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Sir George Henderson, Secretary of the Department of Health for Scotland, spoke on March 30 to the Edinburgh City Business Club on the hospital service under the N.H.S. Act. He said that the transfer to the State had been necessary in order to weld together a miscellaneous collection of hospital organizations in the interest of progress in treatment, medical education, and research; but there would be no startling changes immediately. The hospitals to be transferred were all public hospitals. Everyone in the country would be entitled to free hospital treatment as necessary, but the patient might accept parts of the Service and reject others—for example, a patient might go to a private nursing-home in a State ambulance. Progress was bound to be gradual. Building would remain difficult for some time, but at some date they would have to undertake the building of new hospitals to replace out-of-date ones. Buildings were less important than the spirit of the staff who worked in them. They confidently hoped that the great professions whose task was to heal and tend the sick and injured would co-operate freely and whole-heartedly in that important venture. It was sometimes said that they would not retain any of the spirit of voluntaryism; that they would lose a lot of the kind of service so freely given to-day by public-spirited men and women. They hoped not. There were numerous ways in which voluntary effort could help the Service. There was one point on which he might correct a common misapprehension—the substantial endowment funds of many of the voluntary hospitals. In the main these funds were not being taken over by the Government. They would go to the new boards of management, who would hold them on trust and use them for purposes similar to those for which they were now held.

SUDDEN DEATH AFTER INTRAVENOUS SODIUM BISMUTH TARTRATE

BY

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Bismuth, in the form of sodium tartrate ("sobita"), is widely used in the Tropics for the treatment of yaws. The dosage varies from ¼ to 3 gr. (32 to 200 mg.), according to weight and age, given intramuscularly in aqueous solution. A series of from three to six injections at weekly intervals constitutes the usual course, and towards the end of such courses mild bismuth poisoning, as demonstrated by blue gums and gingivitis, is occasionally seen, but untoward results are very rare.

Manson-Bahr (1940) states that in Tanganyika over a million cases have been treated with this drug since 1924, and he mentions no fatalities. During the period 1933 to 1942 almost a quarter of a ton, representing more than one and a half million adult doses, has been administered in the Gold Coast, with no recorded fatalities. Dowds (1936), in Rhodesia, has reported three deaths following subcutaneous injection of sobita, but in these cases the quantities administered were very much larger than the usual dose (25, 13, and 25 gr. (1.65, 0.85, and 1.65 g.) respectively), and death occurred from six to fourteen days afterwards, renal damage being a prominent feature.

The toxicity of bismuth is stated by Smith (1934) to be ten to twenty times greater by the intravenous than by the intramuscular route. Cushny (1947) states that in mammals large doses of sodium bismuth tartrate act chiefly upon the central nervous system, causing accelerated respiration, violent convulsions, and slowing of the heart, with temporary cessation of the beat. He quotes Masson as describing a direct depressant action upon the heart with irregularities of which heart-block is the commonest.

Klauder (1923) demonstrated that in the rabbit the maximum single tolerated dose of sodium and potassium bismuth tartrates in aqueous solution by the intravenous route was 0.125 g. per kg. of body weight. There appears to be little record of the toxic effects of intravenous bismuth salts in man, although Fischer (1926) describes a case of severe bismuth poisoning, with recovery, following a course of intravenous bismuth-diasporal.

As long ago as 1925 Harrison pointed out that the technique of intramuscular injection which is commonly employed may easily result in the remedy entering a vein unless precautions are taken to prevent this, such as the separate insertion of the needle and a preliminary pull on the piston before injecting; and Chenoy (1926) records a case in which he assumes that the fatal issue was due to the accidental intravenous injection of an insoluble bismuth preparation in this manner; but perusal of this report leaves considerable doubt whether the injection was as stated, and, if it was, the effects might well have been due to embolism.

The only other case of sudden death from intravenous bismuth that I have been able to trace is that of Magnus (1924), but as I have access to only an abstract of this it is not clear to me what salt or dosage was given. The following cases may therefore be of interest.

Case Reports

Three adult female Africans each inadvertently received intravenously 10 gr. (650 mg.) of sodium bismuth tartrate in aqueous solution. Two of the women collapsed and died within

two minutes, whilst the third collapsed after about six minutes and then appeared unconscious, cold, and with a barely perceptible and irregular radial pulse. No convulsions were observed in any of the patients. The survivor was given 1 ml. of nikethamide subcutaneously, and artificial respiration was applied. She recovered consciousness and was detained for observation.

Post-mortem examinations were performed upon the two fatal cases, but nothing of note was discovered except a remarkable and quite unusual degree of flaccidity of the heart, the musculature appearing otherwise normal. In both cases the lungs were extremely congested. At this time the true nature of the accident was not realized and the livers were sent to the Government analyst, who subsequently reported the presence of bismuth therein.

Because of this report, the survivor was treated with "ametox" and intravenous salines, but signs of bismuth poisoning rapidly appeared and a blue line was visible on the gums on the third day. Diminution of urinary output occurred almost at once, and complete anuria resulted on the fifth day. Intravenous sodium sulphate solution caused excretion to recommence and increase daily until 16 oz. (450 ml.) was passed on the tenth day, when death occurred. All urine passed after admission contained albumin, red blood corpuscles, and casts. The blood-urea estimations showed a rapid rise to a maximum of 240 mg. per 100 ml. on the seventh day, falling to 208 mg. on the day of death.

Post-mortem examination disclosed marked blue gingivitis. The abdomen contained about a litre of clear pale amber fluid. The liver was enlarged, soft, and covered with recent fibrinous adhesions which anchored it to the surrounding viscera. The kidneys were both very pale and swollen, with fine punctate haemorrhages on the surface. The lower colon and rectum were inflamed, with small haemorrhagic spots. No other finding of note was discovered. Microscopy of the kidneys revealed almost complete destruction of the tubular epithelium, with many granular and fatty casts. The liver showed little histological change, but both kidneys and liver contained quantities of extremely finely divided fat throughout the tissue.

The relative quantities of bismuth given and demonstrated by the analyst were as follows :

	Mg. Sobita per kg. Body Weight	Mg. Bi per kg. Liver
Case 1 (immediate death)	13	40
Case 2 (,, ,,)	10	30
Case 3 (delayed death)	11	23

I wish to record my thanks to the medical officers concerned for the courtesy of access to Case 3 and the clinical notes, to the Government analyst for the chemical estimations, and to the late Director of Medical Services, Gold Coast Colony, for his permission to publish this report.

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"The National Assistance Bill provides ample scope for the two classes of administrators—voluntary and governmental—to plan and work together," Mr. John Edwards, Parliamentary Secretary to the Ministry of Health, told the Lancashire County Citizens' Advice Bureau Conference at Manchester recently. He pointed out that after July 5 it would for the first time be possible to put up old folks' homes not to receive the destitute only but to house and provide care and attention to persons, whatever their financial resources, whose age, infirmity, or other circumstances required it. Under the Bill local authorities would also have to provide temporary accommodation for those in urgent need. "In these days of evictions, and with recent memories of flood, storms, and enemy action, I need not define this duty more precisely." The new Bill explicitly laid down that a local authority could contribute to the fund of any voluntary organization providing recreation or meals for old people.

A CASE OF MURINE TYPHUS IN LONDON

BY

T. B. DUNN, M.B., Ch.B.

In recent years there have been a small number of recorded cases of typhus fever in Britain, but all appear to have developed on board ship or within a few days of returning from an area of endemic typhus (Beach and Rennie, 1945; Agnew and Kyles, 1944). The following case is of interest as the patient had not been out of this country for over thirty years.

Case Report

The patient, a Russian-born Jew aged 61, was admitted to the Metropolitan Hospital under the care of Dr. Norman Hill on June 14, 1947, the ninth day of his illness. While at a cinema he had complained of sudden headache and was shivering. Next day he was confined to bed with fever, slight cough with scanty sputum, and severe headache, which remained the dominant symptom throughout his illness. He was treated at home with sulphadiazine, but the fever continued and he became delirious and prostrated. His breathing seemed to be "short" and difficult at times. On the seventh day a rash appeared, being first noticed on the arms.

On admission the patient presented a picture highly suggestive of typhus fever despite the fact that careful examination showed no signs of louse or flea infestation, flea-bites, or excoriations. He was in low delirium, from which he could be roused, but could give no history and complained only of severe headache. He had a vivid and profuse maculo-papular rash on limbs and trunk, but not on the face, palms, or soles. The rash at first faded on pressure, though later it did not. The conjunctivae were suffused. He was dehydrated, had a dry skin and a dry tongue with thick blackish fur, and passed a small quantity of highly concentrated urine. The pulse was rapid and feeble. B.P. 90/70, P. 110, T. 101° F. (38.3° C.). There was passive congestion of the lungs, with a poor percussion note and fine crepitations at both bases. There was slight stiffness of the neck and back, but no other C.N.S. signs were found.

The cerebrospinal fluid contained 17 cells per c.mm., mostly lymphocytes; protein, 40 mg. per 100 ml.; chlorides, 700 mg. per 100 ml. A blood count showed 11,000 white cells per c.mm. (polymorphs 71%). The blood urea amounted to 50 mg. per 100 ml. on the tenth day. A radiograph of the chest confirmed the passive lung congestion. The Weil-Felix reaction on the eleventh day of the illness showed agglutination with *Proteus OX* 19 at a dilution of 1 in 125. Three days later the titre had risen to 1 in 500, thus confirming the diagnosis. No agglutination was obtained against *OX* 2, and against *OX* K the titre remained at 1 in 25.

On the twelfth day the temperature fell by crisis to 96° F. (35.6° C.), and remained at that level for three days before returning slowly to normal. He vomited many times on the day of the crisis and became incontinent of urine and faeces. For two days he remained very ill and collapsed, but thereafter his general condition improved steadily. His mental state improved slowly, but one week after the crisis his cerebration was still very slow.

He was later transferred to the Park Hospital, Hither Green, under the care of Dr. H. S. Banks, at whose request an investigation of the patient's serological reactions was made by Dr. Janet S. F. Niven at the National Institute for Medical Research. Using rickettsial suspensions as antigens, a positive reaction for murine (flea-borne) typhus was obtained, the antibody titre against the murine rickettsiae being 1 in 2,560, against louse-borne (epidemic) rickettsiae 1 in 640. Sera taken at later stages during and after convalescence showed a steady fall in agglutinating antibody with approximation of homologous and heterologous titres. The complete results of these and tests with similar South African sera will be published later by Drs. Gear and Niven.

The patient had left Western Russia 36 years ago. He did not admit to having had typhus fever or any febrile illness while

in Russia. He was employed as an egg-tester at the London docks, and two weeks before the onset of his illness had been dealing with a cargo of eggs arriving by ship from Poland—a journey which took seven days. He was quite definite that he had never had any louse infestation, but did admit to being bitten frequently by fleas while at work. The Ministry of Health intended to carry out a rickettsial survey of the rats in the docks, but could find no rats in that area.

Comment

The fact that the patient was a Russian-born Jew with no louse or flea infestation was suggestive of Brill's disease, which occurs sporadically along the North-east American seaboard amongst immigrants born in Eastern Europe. In these cases no louse or flea infestation could be found despite an illness characteristic of typhus fever. They were thought to be examples of murine typhus, but Zinsser (1934) after prolonged epidemiological and clinical studies considered them to be recrudescences of louse-borne typhus fever acquired at an earlier time of life in endemic typhus areas of Eastern Europe. Plotz (1943) showed by complement-fixation tests that these cases were serologically identical with louse-borne typhus. It is surprising that similar cases have not been recorded in this country despite a steady influx of Eastern Europeans since the first world war.

The present case, however, was subsequently shown by agglutination tests to be of the murine (flea-borne) type. This is normally enzootic in rats and can be transmitted to man by the flea vector. Brigham (1943) has brought forward evidence suggesting that mice may also act as carriers. If this does occur it must be uncommon, as other workers have on many occasions been unable to demonstrate mice infection in areas of murine typhus where rats were infected. No examination of mice in the docks was made in this case.

As there was no rat infestation in that area of the docks, and as the disease is endemic in Poland, it seems reasonable to assume that the source of infection was the Polish ship. The egg-packing cases may possibly have been flea-contaminated either before loading or during transit. None of the patient's fellow workers were infected.

Although the man had a large number of contacts during the incubation period the risk of further human spread was small, as the typhus was of the murine type and flea infestation was apparently transient. No further cases were reported.

My thanks are due to Dr. Norman H. Hill and Dr. H. S. Banks for their help and advice, and to Dr. Janet S. F. Niven for her help with the serological results.

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The Finance Bill now before Parliament exempts certain drugs and medicines from purchase tax. The relevant provisions, which will take effect from June 1, are set out in detail in Notice No. 78M of April, 1948, issued by the Commissioners of Customs and Excise. In general terms and subject to conditions about the containers and their labels the preparations exempted are those which consist of one or more substances described in: (*a*) any monograph in any edition of the *British Pharmacopoeia*; or (*b*) any monograph, or the Formulary, in any edition of the *British Pharmaceutical Codex*; or (*c*) the National (War) Formulary, issued by His Majesty's Stationery Office; or (*d*) any Formulary approved by the Minister of Health for the purposes of the National Health Service. These substances may be compounded in the ordinary way with excipients, vehicles, bases, or preservatives.

TWO CASES OF TETANUS NEONATORUM

BY

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AND

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Tetanus neonatorum is a rare condition in this country and reports of its occurrence are hard to find. While occasional cases are recorded in foreign literature, the latest reported in this country appear to be those of Johnston (1928) and Renton (1918). The occurrence, therefore, of two cases within two months prompted us to put them on record, together with an indication of the possible source of infection in one case.

Case Reports

Case 1.—The patient was a normally delivered male child, born at home under the care of a district midwife. He was admitted on the eighth day with a 24-hours history of difficulty in feeding, apparently due to trismus. On examination he was seen to be extremely rigid, and the examination itself stimulated the onset of spasms of tetanic type. The umbilicus, from which the cord had separated before admission, showed a slight purulent discharge with surrounding inflammatory reaction. Aerobic culture of the pus produced a profuse growth of *Staph. aureus*, but anaerobic culture revealed no *Clostridium tetani* at this stage. The case was diagnosed as tetanus neonatorum, and vigorous antitetanic treatment was started. The infant appeared to improve for two days, but collapsed and died on the third day after admission.

Post-mortem examination showed the picture of death from asphyxia. There was, in addition, evidence of mild inflammatory reaction around the umbilicus, while beneath the umbilical scar was a small bead of thick pus. The Gram-stained films from the pus failed to reveal *Cl. tetani*, but anaerobic culture of the umbilicus and ligamentum teres produced a mixed growth of organisms from which virulent *Cl. tetani* was isolated.

Case 2.—This case occurred about seven weeks after that just described, and affected a male child 9 days old, also born at home. In this case labour had been difficult and there was at first some suspicion that the symptoms were due to birth injury. However, after admission to hospital the clinical symptoms became typical. This child also died on the third day after admission in spite of vigorous treatment. Post-mortem examination revealed essentially the same picture as that seen in Case 1, but *Cl. tetani* was not isolated from the post-mortem material.

Investigation

The occurrence of these two cases, both delivered by different district midwives, led to investigations into the origin of infection. These were carried out by Dr. Ruby Bell, senior assistant medical officer of health in charge of maternity and child welfare, and Prof. D. T. Robinson, Liverpool City bacteriologist, to whom our thanks are due for the information given below.

The instruments, gauze, lint, ligatures, and dressings used by midwives were all cultured, but failed to reveal the presence of *Cl. tetani*. Both mothers, however, had sprinkled their infants' umbilical stumps with baby powder—of a different make in the two cases. These were obtained and cultured. The powder used on Case 2 gave a good growth of virulent *Cl. tetani*, but none of these organisms were isolated from the powder used on Case 1. Accordingly several samples of powder of the same brand as that used by the mother of Case 2 were obtained from various chemists in the city. In addition several other

brands of baby powder were obtained to act as controls. All the samples of powder of the brand used in Case 2 showed the presence of numerous anaerobic organisms, though *Cl. tetani* was not isolated, while the control powders gave no such growth.

The makers of the suspect powder were approached and submitted the various raw materials used in its manufacture. These were: aluminium silicate (kaolin), magnesium silicate, boric acid, and perfume. The last three ingredients proved to be blameless, but from the kaolin an anaerobic spore-bearing bacillus was isolated, which, however, proved to be avirulent on animal inoculation. The use of this kaolin in the manufacture of the powder was discontinued by the manufacturers.

Summary

Two cases of tetanus neonatorum are described. Investigation of the origin of the infection suggests that the dusting powder used in one case may have been the cause. The origin of infection in the other case remains uncertain.

Our thanks are due to Prof. N. B. Capon for permission to publish the case histories; to Prof. W. M. Frazer for permission to use the results of the public health investigations; to Prof. A. W. Downie for carrying out virulence tests on the post-mortem material, and to Prof. Sheehan for advice in preparing these notes.

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Medical Memoranda

Fat Indigestion in a Breast-fed Infant

This case seems worthy of record because the mother had a higher percentage of fat in her breast milk than I can find recorded, and because it demonstrates an uncommon cause of feeding difficulty in the breast-fed infant.

CASE HISTORY

The patient, a female infant aged 3 months, was brought to me with a complaint of vomiting, frequent large motions, and of crying after feeds. The birth weight was 8 lb. 8 oz. (3.85 kg.) and the weight at 3 months 12 lb. 13 oz. (5.81 kg.). The child was fully breast-fed with four-hourly feeds, and the history of vomiting and indigestion dated back to the end of the first month. At that time the vomiting was not troublesome, but it rapidly became quite severe; concurrently the motions became copious and more frequent than normal—up to five a day—but they remained normal in colour and consistency. Crying, with drawing up of the legs after feeds, became troublesome, especially in the latter part of the day, and in view of these findings the difficulty was thought to be due to overfeeding. The time at the breast was therefore cut down, boiled water being given before feeds to diminish the amount of milk sucked. These measures improved the vomiting considerably, the motions became more normal, and the rate of weight increase was diminished; this seemed to confirm the diagnosis of overfeeding.

At 2½ months, however, the vomiting became more severe again, the motions were frequent and green, and for the first time there was some weight loss. At 2½ months large friable curds began to appear in the vomits and in the motions, and a test feed at this time showed no evidence of overfeeding. The possibility of fat indigestion was considered, and this was confirmed by an analysis of a 24-hour specimen of breast milk, which showed a fat content of 7.4%. It was decided to wean the baby, as the mother had been losing weight steadily throughout lactation, and this was thought to be connected with her high fat loss through the milk. She made a point of saying that she took very little fat in her diet, and this corresponds with the finding of other workers that the diet has very little influence on the composition of breast milk.

The baby was weaned on to a modified National dried milk with a low fat percentage initially, and within a week the motions reverted to normal and the vomiting ceased, as did the crying after meals. The baby gained weight normally, and when she was last seen at the age of 8 months she weighed 18 lb. 9 oz. (8.42 kg.) and there had been no further difficulty with feeding.

A rather unusual feature of this case was that, in spite of a gross excess of fat in the breast milk, the indigestion was never severe enough to cause any significant loss of weight.

DISCUSSION

A survey of the composition of human breast milk in 21 cases of feeding difficulty in breast-fed infants was reported by R. C. Jewesbury (1937). He found a variation in the fat content of between 2.9% and 6.7%. The value of 7.4% in the case recorded above is unusually high, being 2.5% more fat than is present in Jersey cows' milk. The high fat value undoubtedly was the cause of the vomiting and curdy motions, as these cleared up completely after the infant was weaned. I would like to make it clear that weaning is not the usual practice in these cases, for they often respond to the giving of a protein preparation immediately before each feed and to being kept at the breast. In only a few cases is weaning necessary, and then as a temporary measure, the infant being fed on expressed breast milk from which the fat has been skimmed. Weaning in the above case was resorted to only because of the excessive loss of weight by the mother, which was thought to be due to the heavy loss of fat through the breast milk.

The method of obtaining the 24-hour specimen of milk is perhaps of importance, because the composition of breast milk is known to vary widely both with the time of day and even with the time during the feed at which the specimen is taken. This specimen was obtained in the following manner: at the 6-a.m., 2-p.m., and 10-p.m. feeds two teaspoonfuls were expressed from the first breast before the feed began and two teaspoonfuls from the second breast after the baby had finished sucking; at the 10-a.m. and 6-p.m. feeds one teaspoonful of the "middle milk" was expressed from each breast. These specimens made up the 24-hour sample, and the fat content of the total amount was estimated.

Finally, it must be emphasized that "the milk disagreeing with the baby" is a very rare cause of difficulty over breast-feeding, and that cases thus labelled, and so often weaned as a result, are most commonly really due to overfeeding or underfeeding.

J. D. L. REINHOLD, B.M., M.R.C.P.

REFERENCE

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A Case of Multiple Embolism with Repeated Embolectomy

Below is recorded a case of repeated embolism in a patient with heart disease, in which embolectomy was performed twice within 14 days, with a successful result.

CASE REPORT

Mrs. J., aged 64, was admitted to St. Helier Hospital, Carshalton, at 12 noon on Nov. 23, 1946, having suddenly lost consciousness while on a trolley-bus with her daughter. At the time of admission she was completely unconscious, with stertorous breathing and generalized flaccidity. At 3 p.m. she regained consciousness and vomited some bilious material. It was then found that she had a past history of rheumatic fever in her teens, and had been taking digitalis at intervals over a long period. She had had occasional "dizzy spells," and at one time had been in bed for six months on account of heart disease.

On examination she was obviously an extremely sick woman, with dyspnoea, cyanosis, and marked oedema of the legs. The heart was enlarged, with signs of mitral and aortic disease. The pulse was irregular and the blood pressure 160/100. The liver was grossly enlarged, pulsating, and tender, and there were crepitations at the bases of both lungs. A diagnosis was made of advanced aortic and mitral disease with congestive failure and a small cerebral embolism.

At 5 p.m. on the same day the patient complained of coldness of the left hand. This was soon succeeded by pain in the whole limb, with definite duskiness of the skin. No arterial pulsation could be detected below the upper part of the left brachial artery, while the whole limb was blue, cold, and painful. The pulse at the right wrist was easily palpable. At this stage I was asked by the house-physician to see the patient. As she appeared to be desperately ill I waited for a couple of hours in the hope of spontaneous improvement in the left arm. After this time the local condition was no better, and an embolectomy was undertaken.

First Operation (Nov. 23).—Under local analgesia the brachial artery was exposed in its upper third. It was found to be pulsating in the whole length of the wound, and the embolus was not palpable. The adventitia was stripped from the artery, and a second incision

was then made in the lower part of the arm. The artery was here found to be contracted and non-pulsatile, and the embolus was felt under the upper corner of the incision. The artery was opened below the embolus, which on removal was found to be 3/4 in. (1.9 cm.) long. Blood was allowed to escape for a moment to wash the artery through. As the vessel was still in spasm suturing was by no means easy. The usual technique was employed.

Post-operative Course and Treatment.—She was given 200 mg. of dicoumarol and 10,000 units of heparin at once, followed by 5,000 units of heparin six-hourly for six doses. By this time the prothrombin index was 70% of normal and the prothrombin time was 44.4% above normal. Treatment for the heart condition was also employed. The patient was desperately ill for some days, and it seemed doubtful if she would survive. The pulse at the left wrist became faintly perceptible some fourteen hours after operation. She responded to treatment for her heart condition, and six days after operation her general condition was greatly improved and she had a strong pulse at the left wrist.

On Dec. 4 she had a sudden attack of dyspnoea with pain in the chest, which was attributed to a small pulmonary embolus; presumably thrombosis had also taken place in the right auricle. On Dec. 7 she had a sudden sharp pain in the right leg, which became cold and blue from the knee downwards. Pulsation was present in both femoral arteries and in the left dorsalis pedis artery. Vigorous pulsation could be felt in the right popliteal artery as far down as the middle of the knee-joint, where it ceased abruptly. A diagnosis of popliteal embolism was made.

Second Operation (Dec. 7).—Again under local analgesia the right popliteal artery was exposed and an embolus measuring 1½ in. (3.75 cm.) in length was removed from the bifurcation of the artery. Dicoumarol and heparin were employed in similar dosage to that after the first operation. The leg rapidly recovered normal colour and warmth, and pain was relieved. Although the dorsalis pedis was not palpable, it was obvious in a few days that the circulation of the limb was satisfactory. The wound gaped after removal of stitches and had to be resutured on Jan. 21, 1947, under local analgesia. The heart condition improved gradually, and no further embolism had occurred when the patient was discharged on March 10, able to walk and take a moderate amount of exercise. Throughout the whole illness she had been an extremely plucky and co-operative patient.

Most surgeons now recognize the merit of early embolectomy in such cases, but there may still be many practitioners in this country who are inclined to adopt conservative measures, thus losing the six to ten vital hours within which a successful operation may be performed.

I am indebted to the physicians of the hospital, especially Drs. Pounds and Jelliffe, who undertook the medical treatment of the patient.

E. N. CALLUM, F.R.C.S.Ed.,
Late Surgeon, St. Helier County Hospital, Carshalton, Surrey.

The "Kang Cancer" of North-West China

The "kang," or heated brick-bed, of Northern China has been described by many travellers, but the common and striking form of epithelioma associated with its habitual use has received little notice in the literature of malignant disease.

I spent the early part of 1947 at Lanchow, the chief city of Kansu Province in North-West China, and encountered "kang cancer" on five occasions; I was assured by many people that it is a common and widespread clinical entity throughout that area. The "kang," or oven-bed, is widely used by Chinese, Tibetans, and others to counteract the intense cold of winter in the high altitudes. It takes various forms, but is usually built of bricks or mud, and forms a hollow platform, 18 in. (45 cm.) or so in height, covered with loose wooden boards. Sometimes the boards have to be moved to make up the fire; sometimes an external grate in the outer wall of the house allows it to be stoked up from outside. The fuel used may be coal, charcoal, or dung. The whole platform is covered with felts and quilts, and forms not only a communal bed but the place where the occupants of the house spend their leisure and eat their meals.

From personal experience—I have, when travelling, slept upon kangs in both Chinese and Tibetan households—I can testify to the comforting warmth of such a bed, even though the hardness of the boards and the acrid smoke escaping between them may be somewhat trying at times.

"Kang cancer" is a squamous-celled carcinoma arising in the skin over the great trochanter, and is probably in most cases a malignant degeneration occurring in a chronic burn scar. It may be compared with the much better known "kangri" epithelioma of Kashmir, which is caused by the constant irritation of a small portable brazier. Occasionally the "kang cancer" may arise over the os calcis or the olecranon, but I have not seen it in either of these sites.

Of the five cases that I saw one was an enormous ulcer of the thigh and buttock associated with malignant recurrence after late surgery, three were papillomatous tumours with broad bases and without ulceration, and the fifth was a small scirrhous ulcer with a nodular floor and raised irregular edges. The first four occurred in middle-aged men and were all in the right hip region. The fifth was in a very old woman and was on the left side. All except the first were treated by radical excision and skin-grafting.

A TYPICAL HISTORY

Mr. S. K. Wang, a Chinese opium-smoker aged 60, came from Lo T'u village (Tsinghai). He stated that he always slept on a kang, in which he burnt horse dung, and that he always slept on his right side. His only complaint was of a lesion over the right great trochanter which had been present for four years. He was quite healthy, apart from a large papillomatous tumour (see photograph) growing in the skin over, but not adherent to, the right great

FIG. 1 FIG. 2

Papillomatous epithelioma ("kang cancer") in a 60-year-old Chinese opium-smoker.

trochanter. The inguinal lymph glands were not abnormally palpable and were soft. Operation was carried out on May 28, 1947, under spinal analgesia, and consisted of wide excision of the tumour together with 1½ in. (3.75 cm.) of skin all round and all tissues down to and including the deep fascia. Thiersch grafts were applied after three days, and the subsequent progress was uncomplicated.

COMMENT

The association with opium smoking is to be noted. A man is naturally more likely to burn himself unawares while under the influence of this drug, and it is presumed that the "kang cancer" is caused by chronic irritation (by friction and heat) of a burn cicatrix rather than by a carcinogenetic stimulant in the smoke. The development of epitheliomata in scars has been known since Marjolin's classical description in 1828. Two types of epithelioma occurring in scars—papillomatous and ulcerating—were described by von Brunn (1903), and correspond with the two types in my five Lanchow cases. The prognosis of such epitheliomata is relatively good. This, as pointed out by Iwamoto (1926), is because the underlying scar tissue discourages penetration by the neoplasm, which tends instead to spread out on the surface.

My acquaintance with this lesion was made during a quite brief visit to inland China. I am sure that anyone interested in the condition and permanently resident in this region could easily collect a large series of cases and study in much greater detail this locally abundant tumour, which is easily amenable to treatment and should be both preventable and easy to detect in its earliest stages.

H. T. LAYCOCK, F.R.C.S.

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Iwamoto, M. (1926). *Mitt. allg. Path. path. Anat.*, **2**, 573.
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Reviews

THE LIVER

Lectures on the Liver and its Diseases, comprising the Lowell Lectures delivered at Boston, Massachusetts, in March, 1947. By H. P. Himsworth, M.D. (Pp. 204; illustrated. 18s. 6d.) Oxford: Blackwell Scientific Publications. 1947.

This is one of the outstanding medical books of recent years. It is everything that a monograph should be. It reveals the author's intimate familiarity with the literature of hepatic disease not only of the present but also of the past century. He handles the material with the sureness of touch which can be obtained only by personal work in the field. Much of it is highly original, and both the general outlines of the monograph and the detailed writing are models of clearness. To anyone interested in diseases of the liver it is indeed a fascinating book.

A quarter of a century ago, as a result of the discovery of the van den Bergh reaction, the pathology of the liver was written largely in terms of the liver lobule and the biliary tract. Professor Himsworth emphasizes the circulation and the unique portal system, and his analysis is based on the vascular sinus and its investing sheath of parenchymal cells. Swelling of the liver cells, compression of the sinus, and ischaemia are the common factors in a large and apparently diverse group of diseases. After developing this vascular theme Professor Himsworth discusses the nutritional factors in hepatic disease and makes a clear-cut distinction between massive hepatic necrosis, with its sequel of post-necrotic scarring, and diffuse hepatic fibrosis. The former results from deficiency of protein, and more particularly of the amino-acid cystine; the latter from long-continued infiltration of the liver cells with fat and other substances. He next considers the effects of micro-organisms and toxins on the liver and outlines the concepts of toxipathic and trophopathic hepatitis. He then discusses the syndromes of hepatic failure and makes a brief but vivid survey of the pathology of the liver in man.

The virtue of this monograph lies in the elucidation and illustration of fundamental principles in the pathology of the liver, such as significance of the vascular pattern, the supply of protein and oxygen to the cells, and the effects of infiltration and swelling of the parenchyma. A criticism is that Professor Himsworth makes it all too simple. Circulatory factors may well explain the distribution of massive necrosis of nutritional origin, but they hardly account for its explosive onset. Again, after reading Professor Himsworth's explanation of the protective action of thio-amino-acids in chloroform poisoning one almost feels one has been the victim of a confidence trick, for in his enthusiasm for his pet theory he has omitted any discussion of the part played by the sulphydryl groups in the life of the cell and the nature of their combination with chloroform and arsphenamine.

Although we have learned a great deal about the pathology of disease of the liver, we are still ignorant of the mechanism of many of the symptoms. We do not know why patients with infective hepatitis suffer from nausea and vomiting, why these symptoms may recur after the liver has apparently healed, and why they are aggravated by alcohol. We do not know why patients with chronic jaundice itch. The study of symptoms, from which the Mackenzie–Lewis school of clinical scientists hoped so much, has been much less informative than the experimental study of disease in animals. It has been a defect of clinical medicine and surgery in this country that its professors have not turned instinctively to the experimental laboratory for the solution of the problems which continually appear in clinical work. The crucial moment in Professor Himsworth's researches was when he decided that the best way to begin studying T.N.T. poisoning in man was to feed T.N.T to rats. He is to be congratulated that from this beginning he has been able to make such a notable contribution to our understanding of liver diseases in general, for in the crowded schedule of the professor of medicine of to-day these things are not done without very special toil and enthusiasm.

L. J. WITTS.

CURRENT PSYCHOTHERAPY

Current Therapies of Personality Disorders. Edited by Bernard Glueck, M.D. Proceedings of the Thirty-fourth Annual Meeting of the American Psychopathological Association, held in New York City. (Pp. 296. 17s. 6d.) London: William Heinemann (Medical Books). 1946.

The American Psychopathological Association is to be congratulated on the wisdom of its Council in publishing this volume of papers read at its 1945 meeting. The contributions have been skilfully grouped into four sections: (I) The Modern Psychiatric Hospital: (II) The Physiochemical Techniques in Psychiatry; (III) Psychotherapeutic Techniques in Psychiatry; and (IV) Psychiatric Guidance and Rehabilitation Techniques.

The theme of the first section derives from the increasing appreciation of the social origins of the personality. The mental hospital must provide a culture which reflects that of our society in general and it must maintain many and varied relations with its community if patients are to be helped to return to society with confidence. The second section follows familiar lines and more interest will be aroused in the next section. Here are an account by Moore of his "bibliotherapy," a paper on the "Alcoholics Anonymous" movement, which is more successful as a description than as an interpretation of it, and an excellent paper by Slavson on group therapy. (In the latter, however, we note with surprise that the author has failed to appreciate the work of Bion and Rickman in this country, for he includes this under his term "mass therapy" rather than under "group therapy.") Also in this section is Lindner's evaluation of his hypno-analytic technique; unfortunately because of the author's "flashy" style it leaves an impression of uncertainty with the reader. The last section contains useful summaries of work in the adult and child fields, and there is an arresting final chapter on family guidance by L. K. Frank.

Dr. Glueck's broad vision of the tasks of psychiatry emerges in his presidential address: "The psychiatry of the future can become a significant and far-reaching prophylactic agent against the palpable confusions and perplexities of a world that is disintegrating before our very eyes." The picture of the therapeutic trends given by this volume certainly suggests that active groups of American psychiatrists are responding to this challenge by evolving theories and therapies in which the basic relationships of the individual with his social field are given full consideration.

J. D. SUTHERLAND.

OCCUPATIONAL SKIN DISEASE

Occupational Diseases of the Skin. By Louis Schwartz, M.D., Louis Tulipan, M.D., and Samuel M. Peck, B.S., M.D. Second edition, thoroughly revised. (Pp. 964; 146 illustrations and a coloured plate. 63s.) London: Henry Kimpton. 1947.

The second edition of this comprehensive textbook has additional illustrations and is a useful and full book of reference. It includes, in addition to doctrinal information on such topics as patch-testing and sensitization, carefully recorded facts from first-hand experience, together with a review of current opinion. The authors have enlarged the chapter on occupational diseases of the mouth to include occupational affections of the eye and a list of substances harmful to the eye. As might be expected, the chapter on the effects of irritant plants and woods is extensive, and the authors describe some sources of skin irritation happily unknown or uncommon in Great Britain. They discuss fully (mainly from the American point of view) the question of compensation, for information on which textbooks are so often consulted. However, the chapter on the medico-legal aspects of occupational dermatitis will appeal to readers in all countries and should strengthen the position of the doctor as an expert witness. Dermatitis from wearing apparel is dealt with fully, and many compensation cases may so arise.

The occupations described as giving rise to diseases of the skin are very wide, including those of meat porters and packers, dockers, veterinary surgeons, trappers, office workers, teachers, and salad preparers, to name only a few. The authors express the view that in most cases of mild industrial dermatitis immunity to the skin irritant will develop if work is continued with the protection of special ointments and clothing. This is of some interest, since it does not accord with the general trend of opinion in Britain. They dispose in three pages of the general

treatment of occupational diseases of the skin, and devote much space to considering the prevention of dermatitis in different industries, which leads to some repetition. One of the introductory chapters is, however, devoted to general methods of prevention under the headings of protective clothing, protective ointments, and industrial skin cleansing. The investigation of occupational skin disease is described in detail, with emphasis on patch-testing to identify the causal agent or agents, but variations in the methods of work of individuals or groups is evidently of less significance than in Britain. Extensive bibliographies are given at the end of each chapter, and the index is comprehensive.

SIBYL HORNER.

ST. THOMAS'S HOSPITAL

The Story of St. Thomas's 1106–1947. By Charles Graves. (Pp. 72. 8s. 6d.) London: Faber and Faber.

The great teaching hospitals of London have on the whole been well served by historians. St. Thomas's in particular owes much to the devoted labour of the late Prof. F. G. Parsons, whose three-volume history (1932–6) is a model of its kind. Although admirably adapted to the needs of historians and antiquarians Parsons' book left room for a short popular account of the hospital designed for the general reader. The choice of so experienced an author as Mr. Charles Graves to write such a book was a happy one, and has resulted in the production of a worthy tribute to the spirit and tradition of an institution that has "survived the dissolution of the monasteries, the depredations of kings, fire, plague, and some of the worst bombing of the blitz." It was printed in Czechoslovakia, and special praise is due to the illustrations, which are well chosen and set a new standard of excellence.

In the first chapter the author tells how the Priory of St. Mary the Virgin was established in Southwark before the Norman Conquest and how it carried out its work of relieving the sick. The Infirmarium, situated on the site now occupied by Southwark Cathedral, was known as St. Thomas's Spital from the time of Thomas à Becket's canonization in 1173. Mr. Graves sets the early history of the hospital against its social background and sketches in the state of contemporary medicine with great skill. The closure of the priory and hospital at the Dissolution of the Monasteries in 1540, its restoration as one of the three Royal Hospitals by Edward VI in 1553, and its fortunes during the Great Plague and the Fire of London are notable episodes in the story. Many interesting extracts are given from old hospital records and standing orders relating to methods of treatment, nurses, resurrectionists, and the exclusion of illicit beer from the wards. The beginnings of modern medicine and the growth of the teaching hospital are next described, with special reference to such great figures as Wharton, Mead, Cheselden, and Astley Cooper. There is a good account of that period of nearly a century when St. Thomas's and Guy's were united for teaching purposes, as well as of the more recent history of the medical school and the establishment of special clinics and services. Almost half the book is about Florence Nightingale and the development of modern nursing, but this section is very well done and is not disproportionally long in a book intended for the general reader. There is an inspiring account of St. Thomas's part in the war years. At this turning point in the history of British medicine it is well to be reminded of the achievements and traditions of a hospital that has given continuous service to the sick and poor of London for more than 800 years.

W. J. BISHOP.

The report of the Water Pollution Research Board for 1946 outlines some of the activities of the Water Pollution Research Laboratory at Watford, Herts, and describes the work done on the cleansing of mussels from polluted waters. Sea water is pumped to the cleansing station and treated with chlorine; the mussels are then immersed in it for about 16 to 20 hours, and during this time they excrete a compact mass of faeces and pseudo-faeces. After two treatments with sterilized sea water the mussels are free from pathogenic organisms. Research has also been conducted on the application of D.D.T. and gammexane to percolating filters at a number of sewage works. Questions relating to pollution from beet-sugar factories and by cutting oils from engineering works have also been the subject of study. The report is published by H.M.S.O. (price 1s., by post 1s. 2d.).

BOOKS RECEIVED

[Review is not precluded by notice here of books recently received]

New and Nonofficial Remedies. 1947. Issued by the Council on Pharmacy and Chemistry of the American Medical Association. (Pp. 749. 21s.) London: J. B. Lippincott. 1947.

A list of preparations found acceptable by the American Council on Pharmacy and Chemistry up to Jan. 1, 1947.

The British Journal Photographic Almanac, 1948. (Pp. 492. 6s.) London: Henry Greenwood. 1948.

Contains details and formulae of photographic methods.

Human Physiology. By F. R. Winton, M.D., D.Sc., and L. E. Bayliss, Ph.D. 3rd ed. (Pp. 592. 25s.) London: J. and A. Churchill. 1948.

A textbook intended primarily for medical students.

What Life Has Taught Me. By W. R. Inge and others. (Pp. 310. 10s. 6d.) London: Odhams Press. 1948.

A collection of essays by 25 distinguished men and women.

Tuberculosis. By F. M. Pottenger, A.M., M.D., LL.D., F.A.C.P. (Pp. 597. 60s.) London: Henry Kimpton. 1948.

An account of the pathology, symptomatology, diagnosis, and treatment of pulmonary tuberculosis.

Practical Photomicrography. By R. F. E. Miller. (Pp. 101. 5s.) London: Percival Marshall and Co. 1948.

A practical manual for the beginner.

The Mothercraft Manual. By M. Liddiard, S.R.N. 11th ed. (Pp. 176. 5s.) London: J. and A. Churchill. 1948.

An outline of the principles taught by the late Sir Truby King.

A Text-Book of Midwifery. By R. W. Johnstone, C.B.E., M.A., M.D., F.R.C.S.Ed., M.R.C.P.Ed., F.R.C.O.G., F.R.S.Ed. 13th ed. (Pp. 570. 30s.) London: Adam and Charles Black. 1948.

The text has been revised and there is a new section on the Rh factor.

Hospital Care in the United States. (Pp. 631. $4.50 or 25s.) New York: The Commonwealth Fund. London: Geoffrey Cumberlege (Oxford University Press). 1947.

A study of the hospital services by the Commission on Hospital Care.

Inside the Asylum. By John Vincent. (Pp. 115. 6s.) London: George Allen and Unwin, Ltd. 1948.

An autobiography.

Principles of Management. By M. A. Cameron, M.A. (Pp. 51. 2s. 6d.) London: George G. Harrap and Co. 1948.

A short discussion of management, administration, and leadership.

Die Röntgendiagnostik der Wirbelsäule. By Adolf Liechti. 2nd ed. (Pp. 364. Paper covers, 56 Swiss francs; stiff covers, 60 Swiss francs.) Vienna: Springer-Verlag. 1948.

A textbook of the radiological diagnosis of disorders of the vertebral column.

The British Encyclopaedia of Medical Practice. "Medical Progress" and "Cumulative Supplement," 1948. Edited by Lord Horder and others. (Pp. 539. £2 7s. 6d.) London: Butterworth and Co. 1948.

Radon: Its Technique and Use. By W. A. Jennings, B.Sc., A.Inst.P., and S. Russ, C.B.E., D.Sc., F.Inst.P. (Pp. 222. 18s.) London: John Murray (for the Middlesex Hospital Press). 1948.

An account of the production of radon and its uses in medicine and industry.

A History of the Norfolk and Norwich Hospital. By A. J. Cleveland, O.B.E., M.D., F.R.C.P. (Pp. 179. 15s.) Norwich: Jarrold and Sons. 1948.

The history covers the years from 1900 to 1946.

The Venereal Diseases. By J. Marshall, M.D., B.S. 2nd ed. (Pp. 369. 21s.) London: Macmillan. 1948.

A practical manual for students and practitioners.

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ORGANIZATION FOR SPECIALISTS

For many years the British Medical Association has tried to arouse the interest of consultants and specialists in medical organization and medical politics. It has not been easy to do this, because of the absence of any consultant service for the insured population. The B.M.A. through its Hospital Committee and through its Special Groups has done much to encourage consultants to tackle on a systematic basis problems common to them all. Now that consultants and specialists (or specialists for short) are to work in a National Health Service open to the whole community they are faced with a situation that has been familiar to insurance practitioners since 1912. Consultants and specialists need a peripheral and central organization if their interests are to be safeguarded in such matters as remuneration, terms and conditions of service, scope of work, and so on. The Council of the B.M.A. has considered this problem with much care and has described in a recent issue of the *Supplement*[1] its plan for representation of specialists' interests. This part of the Council's report is reprinted in this week's *Supplement*.

The Council proposes that there should be set up Regional Consultants and Specialists (including Hospitals) Committees, and a Central Consultants and Specialists Standing Committee. In doing this it is filling a gap left in the present Act. The Act provides for the formation of Local Medical Committees in the areas of the Local Executive Councils, but provides for no similar committees for specialists. The B.M.A. is therefore setting up Regional Consultants and Specialists Committees in the areas of Regional Hospital Boards. It considers that the majority of the members of each committee should be elected by the consultants and specialists in the region, and that there should be separate representation for those practising whole-time. It proposes, too, that not less than one-quarter of those elected to the Regional Committees by the staffs of non-teaching hospitals should be part-time consultants and specialists. On these committees, too, should be representatives of Local Medical Committees, of medical officers employed whole-time by local authorities, and of medical superintendents. For the first year it is suggested that elections should be on the principle of representation of hospital staffs or groups of hospital staffs. The Central Consultants and Specialists Committee will replace the B.M.A.'s present Consultants and Specialists and Hospital Committees. The majority of the members of the new Standing Committee will be elected by the Regional Consultants and Specialists Committees, and representation will be given to the Special Groups and to practitioners engaged in part-time specialist practice; in addition there will be members elected by the B.M.A. Council and by the Insurance Acts, Public Health, General Practice, and Industrial Medicine Committees. The B.M.A. describes this as a functional machinery not forming part of the Association's constitution but linked closely with it at the centre and also at the periphery. As with the constitution of the Insurance Acts Committee, membership of the B.M.A. is not a requirement for membership of the Regional and Central Committees. This form of organization should satisfy the most thorough-going democrat, and is based upon the long and unrivalled experience of the B.M.A. in such matters.

Some consultants and specialists have already expressed surprise[2] at the suggestion made in the *Lancet* that there should be set up a new organization based largely upon the Royal Colleges and teaching hospitals. It is not easy to treat the suggestion seriously, and we may doubt whether the Royal Colleges would see fit to branch out into medical organization and medical politics when there is in existence a body fitted for this purpose to which more than 90% of the consultants and specialists of this country belong. The President of the College of Surgeons, we understand, has recently reminded the Fellows of the College that by its Charters it exists primarily and essentially to promote and encourage the study and practice of surgery. In his Charter to the Royal College of Physicians Henry VIII declared his intention to institute "a perpetual College of learned and grave men who shall publicly exercise medicine." For the Colleges to embark on the formation of a new organization as is suggested by the *Lancet* would, we believe, be against the spirit and intention of their Charters and be an act of duplication wasteful of time, money, and effort at a moment when there is a grave shortage of medical men for the new service which starts on July 5. The *Lancet* seems to suggest that the new organization will decide what salary grades individual consultants shall be placed in. Any such idea would be completely unacceptable to consultants and specialists and, we may believe, to those responsible for administering the Regional Hospital Boards. The specialist working in the National Health Service will be in contract with the Regional Hospital Board, which, within the framework of the Spens Committee recommendations, will determine the remuneration to be offered for different kinds of work.

To suggest, as our contemporary does, that there might arise a conflict between the interests of the general practitioners and consultants is indeed ill-considered; and to follow this with a proposal for a consultants' medico-political organization would seem to aim at creating antagonism between two important groups of one profession. The Royal Colleges, and especially the Royal College of Physicians, have great historical traditions as bodies of learned men concerned with the intellectual standards and life of medicine. Their function is defined in their Charters and exemplified in their activities. The function of the British Medical Association in medical politics and organization is as clearly defined. The B.M.A. has its

[1] *British Medical Journal Supplement*, 1948, **1**, 77.

[2] *British Medical Journal*, 1948, **1**, 950.

indispensable part to play in safeguarding the interests of the consultants and specialists as it has done for the past thirty-odd years for the insurance practitioner. It has set up a fully representative functional machinery for consultants and specialists in the new service. We may hope that the proposals for a new and separate organization are stillborn and that the medical profession will maintain the power in negotiation that comes through unity.

CUTANEOUS CANCER

Cancer of the skin is more common in the white than in the coloured races. This may be because it usually arises on exposed parts, especially on the face, and the pigmentation and thickness of the skin determine the degree of protection against ultra-violet irradiation, which—in the region of 2,900 to 3,340 Å—is probably important in this connexion. Those with fair hair and sensitive skins that freckle but do not tan are more susceptible than the dark-skinned. In cattle there is evidence that epithelioma occurs much more commonly upon the white areas than upon the normal hide. In surveys conducted in the U.S.A. it has been shown that in the south cancer of the skin may constitute some 50% of all primary cancers, whereas in Chicago the corresponding figure may be little more than 10%. A further survey has shown that, while in certain parts of the continent cancer of the skin in the white population may form from 20% to 40% of all primary growths, in negroes inhabiting the same areas the incidence is no higher than 2% to 4%. Europeans settling in Australia are known to be some ten times more susceptible to carcinoma of the skin than Europeans in Europe. There is, of course, great individual variation. The extreme case is that of xerodermia pigmentosum, fortunately very rare, where the tendency to keratotic and carcinomatous changes in the skin of the exposed parts develops in early childhood and may become uncontrollable before adult life is reached.

In addition to exposure and light, other forms of radiation—heat, *x* rays, and radium—as well as mechanical and chemical irritation may provoke cancer. Oil and tar products are dealt with at length by Henry[1] in his monograph on cancer of the scrotum. Hieger[2] and others have shown that powerfully carcinogenic hydrocarbons can be isolated from pitch and tar and can be synthetized. A high incidence of keratotic and carcinomatous growths of the skin after relatively short exposure in workers engaged in the manufacture of briquettes has been observed in recent years. Argyll Campbell[3] showed that road dust containing 2% of tar would produce in mice cancer of the skin and secondary metastases.

A single injury to the skin may determine the development of carcinoma, though long-continued exposure and irritation is the more potent source. Both basal-celled and epitheliomatous growths can arise in this way, but the latter are the more common. Chronic disease causing chronic irritation may act similarly, and, other things being equal, the earlier in life the disease appears, as with lupus vulgaris, the more likely is malignant change to supervene. A combination of irritant effects is more carcinogenic than a single agent, so trauma to a scar, *x*-ray therapy for lupus, and similar combinations should be avoided so far as possible. For the same reason, those who are recognizably prone to cancer should avoid obvious climatic or industrial hazards.

Cancer of the skin arises most frequently between the ages of 50 and 60 and is much more common in the male—this applies particularly to epithelioma. It must be emphasized, however, that the mortality from cancer of the skin is low (under 2%), and five-year cures are obtained in something like 97% of cases. Basal-celled carcinomata are regarded as locally malignant only, though Sachs[4] has described metastatic lesions in three cases. Occasional areas of transitional or squamous and horny-celled growth are seen in serial sections of most basal-celled carcinomata and it is sometimes difficult to classify these lesions; but it remains a fact that all cancers of the skin, including epitheliomata, are relatively benign, do not readily give rise to involvement of glands, and even then are commonly cured if treated early. This is not true of cancers involving muco-cutaneous junctions or mucous membranes—malignancy is greater and the prognosis is less favourable. The smaller the lesion the better the prognosis, and in all cases only about 10% develop more than one lesion.

Methods of treatment are various and are equally effective in the hands of the experienced. Surgical excision, destruction by diathermy or some other form of electrocoagulation, radiotherapy, or a combination of these measures, are all effective provided the lesion is completely destroyed at the first treatment. Not all carcinomata are radio-sensitive, but for those that are—the vast majority—gamma-ray therapy is probably best for large lesions or for those awkwardly situated. The cicatricial form of rodent ulcer, lesions involving bone or cartilage or glands, and recurrent lesions are best treated surgically. For small lesions, in which the diagnosis is uncertain and histological confirmation required, surgical excision is preferable to preliminary biopsy.

Epitheliomata sometimes grow rapidly to the size of a large pea or a cherry in the course of a few weeks. In appearance they may resemble an acute infective lesion, such as an infected sebaceous cyst or molluscum contagiosum. This early threat of grave malignancy is not usually maintained and the response to treatment is often good. Other epitheliomata progress so slowly that they may for years be mistaken for patches of chronic eczema or psoriasis. Such carcinomata are often intra-epidermal and may remain so for years without penetration or invasion of the dermis. Paget's eczema of the nipple. Bowen's disease, "erythroplasie" of Queyrat (generally affecting the glans penis), and the multiple benign epitheliomata of the trunk described by Graham Little are examples of this chronic form of the disease, which may, however, at any time assume a more malignant phase.

The study of skin cancer suggests some individual, familial, and racial predisposition, and reveals the great

[1] *Cancer of the Scrotum in Relation to Occupation*, 1946. London: Oxford University Press.
[2] *Brit. J. Radiol.*, 1947, **20**, 145.
[3] *Lancet*, 1934, **1**, 233.
[4] *Arch. Derm. Syph., Chicago*, 1946, **53**, 599.
[5] Ibid., 1946, **53**, 307.

importance of external irritants as a cause. Elliott and Welton[5] suggest that a predisposition to cutaneous cancer was inherited in 37% of some 2,000 cases recently reviewed. The satisfactory response to treatment and the low mortality are encouraging, though no doubt largely due to ease of observation, early diagnosis, and accessibility. The almost complete absence of those hideous and destructive lesions seen so often twenty and thirty years ago is a testimony to our steady advance in knowledge and in methods of treatment, to earlier diagnosis, and to the more enlightened attitude of the public.

SMEGMA AS A CARCINOGEN

Two cancer research workers in the U.S.A., Plaut and Kohn-Speyer,[1] have recently reported that horse smegma injected into or painted on the skin of mice produces a small percentage of tumours. They state, "Carcinoma of penis does not occur in people who have been circumcised in the first weeks of life and is rare in people who have been circumcised in childhood or in early puberty. Circumcision in adult life does not affect the frequency of the disease. Phimosis seems to be a predisposing factor. Penile cancer is frequent where personal hygiene is poor; it is rarer where bathrooms are plentiful. All this has been known for decades." Much the same ideas are contained in Sir Ernest Kennaway's[2] recent paper in the *British Journal of Cancer*, where he writes, "The failure of the operation deferred until the fourteenth year to give the protection given by it when carried out on the eighth day suggests that the train of events leading to the malignant growth is set going early in life, and that removal of the cause does not then avert the development of cancer at a much later age. Other forms of cancer are perhaps due to factors acting in youth." The inference is that smegma in the first few years of life brings about irreversible changes in the tissues of the penis.

Fishman *et al.*,[3] at the United States National Cancer Institute, had some years ago investigated the effect of human smegma on the vaginas of 20 young mice, but obtained only negative results. Plaut and Kohn-Speyer used smegma from horses because cancer of the penis is common in that animal and because of the advantage of appreciable quantities being available. The substance was applied every two or three weeks to 400 mice (Paris R 3 strain); 190 had smegma injected into a skin tunnel the walls of which consisted of skin and panniculus carnosus, 120 had subcutaneous injections, and 88 had the suspension of the unsaponifiable fraction of the smegma painted into the tunnel or on the skin surface. About 40% of the skin tunnels broke down, and in those cases the substance was injected subcutaneously. No tumours appeared in the 120 mice receiving only subcutaneous injections of horse smegma. In the 190 in which the substance was put in the skin tunnel, five tumours developed at the site—three papillary warts and two malignant tumours. In the 88 which had smegma painted into the tunnel or on the skin surface, one wart and two malignant tumours appeared. The malignant tumours consisted of two hornifying squamous-cell carcinomas with metastases, one undifferentiated skin carcinoma, and 1 spindle-cell sarcoma with metastases. The latent periods were very short—36, 82, 122, and 247 days for the warts, 130 for the sarcoma, 220 and 423 for the two carcinomas. Control mice were tested with cerumen instead of smegma, since, unlike the penis, the auditory meatus is very rarely the site of cancer. No tumours developed in these mice.

There is therefore evidence that smegma is a weak carcinogen, and the proposition might be put forward, No prepuce, no smegma; no smegma, no cancer. Such an over-simplification obviously invites criticism. First, absence of prepuce probably induces changes in the exposed surfaces. Thus Dean,[4] quoted in the paper by Sir Ernest Kennaway, writes, "There must be some reason why circumcision in infancy immunizes against cancer of the penis while circumcision later in life does not. It may be that when an infant is circumcised and the glans is no longer protected by the prepuce, a denser, thicker epidermis develops, which is resistant to the formation of cancer by chronic irritation. When circumcision is performed in later years the glans may have lost its ability to produce a resistant covering, and although there is no longer irritation from retained secretions, the glans remains relatively sensitive to the contacts of everyday life." Secondly, the smegma was obtained from one site in one species and tested at another site in another species. The ideal test for the carcinogenicity of horse smegma would have been to apply it continuously to the penes of circumcised horses. Thirdly, the carcinogenic activity of the material is no higher than that of a number of other fatty substances of biological origin, which now include the unsaponifiable fractions of liver, lung, kidney, muscle, and spleen—from cancerous and non-cancerous subjects, including the liver of still-born infants—ether extract of mouse mammae, unsaponifiable fraction of cow's cream and milk, some vegetable and animal oils, oestrogens, and some substances found in commercial cholesterol (prepared from cattle brain and spinal cord).

The investigation of carcinogens obtained from tissues has certain peculiar difficulties. Because of the small percentage of positive results large numbers of experimental animals must be used. Again, the nature of the responsible compounds in the complex mixtures of substances remains unknown. As an illustration of this problem, Plaut and Kohn-Speyer point out that the unsaponifiable fraction of the smegma (6%) was about as active as whole smegma. To account for this it becomes necessary to suppose that removal of 94% of the material causes no change in its carcinogenic potency.

The appearance of 8 tumours (4 of them malignant) in 400 experimental mice would represent a very low potency for a synthetic carcinogen; it would be low even for some carcinogens from tissues. For example, Schabad's[5] best preparation (benzol extract of human cancer liver) produced 4 tumours in 179 mice (subcutaneous injection). Steiner[6] with an unsaponifiable fraction of human liver from cancerous or non-cancerous subjects obtained 12 tumours in 56 mice, but in later experiments reported 5 in 63, 12 in 456, and 16 in 440 mice. In his most recent paper Steiner[7] describes an unsaponifiable fraction from the livers of non-cancerous patients which was highly active—27 sarcomas produced in 46 mice. The fraction from the livers of still-born infants showed considerable potency. Des Ligneris[8] applied the unsaponifiable fraction of the livers of South African Bantus to the skin of mice, and numerous skin tumours developed.

Hieger,[9] working on liver and other tissues from cancerous and non-cancerous human subjects, obtained 11 tumours in 28 mice by subcutaneous injection of the unsaponifiable fractions, and then 5 tumours in 30 mice. Other results he reported[10] in later experiments were 3 tumours in 31

1 *Science*, 1947, **105**, 391.
2 *Brit. J. Cancer*, 1947, **1**, 335.
3 *J. nat. Cancer Inst.*, 1942, **2**, 361.
4 *J. Urol.*, 1935, **33**, 258.
5 *Cancer Res.*, 1941, **1**, 853.
6 Ibid., 1943, **3**, 385.
7 Ibid., 1947, **7**, 273.
8 *Amer. J. Cancer*, 1940, **39**, 489.
9 *Cancer Res.*, 1946, **6**, 657.
10 *Nature, Lond.*, 1947, **160**, 270.

mice, 2 in 10, and 3 in 25; and in a large series of about 300 mice injected with commercial cholesterol 6% developed tumours—all transplantable sarcomas. Thus it is obvious that the weakly carcinogenic activity of smegma is shared by numerous other fatty substances of biological origin.

HEALTH CENTRES FOR LONDON

The London County Council received from its Health Committee on May 11 proposals for carrying out the Council's duties under the section of the National Health Service Act relating to health centres. It was stated that these were the first of a series of proposals to enable the Council to develop health centres over the whole of the county. It is not possible at present to undertake much new building, and measures must be limited to ensuring that existing general medical and dental services which might otherwise cease at the appointed day can continue. The Council plans to build one specially designed health centre and to provide nine other centres by converting existing clinics or other suitable buildings; it will also acquire buildings for general medical and dental practitioners urgently needing facilities for group practice.

Subject to the agreement of the North-Eastern Metropolitan Regional Hospital Board and the Executive Council, the L.C.C. proposes to erect on its Woodberry Down estate at Stoke Newington a health centre providing six doctors' suites and two dentists' suites for the general medical and dental services; antenatal, post-natal, and child-welfare clinics; a school treatment centre; accommodation for health education; a foot clinic; and facilities for these services, including a clinical side room. It will be equipped, maintained, and staffed to the satisfaction of the Minister, and so far as general medical and dental services are concerned a professional committee will be appointed and charges made to doctors and dentists for the use of the centre on agreed terms. The area to be served has an estimated population of 10,500, but when the Woodberry Down estate is completed some 6,000 persons will be added. People living outside the prescribed area may also attend the centre. The estimated number of potential patients by mid-1950 will be 1,100 children aged 0 to 4, 1,700 children aged 5 to 14, and 12,200 adults—more when the Woodberry Down estate is finished.

The Council intends to provide ultimately a comprehensive health centre for each area having a population of approximately 20,000, so sited that no residents need travel more than about a mile from their homes to it. The county of London will be divided into 162 health service areas each of which will require a comprehensive health centre, with, in addition, some subcentres in certain special areas.

MICROKYMATOTHERAPY

High-frequency radiations with frequencies in the region of 3,000 megacycles and wavelengths measured in centimetres were the subject of much pre-war research, but it was their value in war that led to the development of apparatus allowing of their practical application. A preliminary report by Krusen[1] and his colleagues on the possible use of high-frequency radiations with a wavelength of 10 cm. to produce therapeutic heat omits little of the historical interest in an account of their development. It was known in 1937 that radiations with a wavelength of a few centimetres could be focused, but the apparatus by which they were produced could generate only a power too low for therapeutic application. By 1939 research workers had raised the wattage of magnetron tubes from two or three to several hundred watts, "but suddenly all such tubes became mysteriously unavailable." This puzzled the American workers, who were not aware that such tubes had become a top-secret device employed in radar. Actually much Anglo-American work was proceeding on the multicavity magnetron tube, and by 1946 it was possible to obtain such a tube with a peak output of 400 watts. Work on the medical application of microwaves could therefore be resumed.

Microwaves have important optical properties and are transported along hollow tubes (wave guides) or coaxial cables. They can thus be "beamed." The first experimental medical work was done on dogs, and the problem of measuring the temperature of the tissues had to be solved. Thermocouples cannot be used during exposure to microwaves, so they had to be inserted before and after exposure. They showed that tissues could be heated by microwaves, and that by increasing output the temperature could be raised almost to any desired level. With a 75-milliampere plate current and a director at 5 cm. distance the skin temperature could be raised by between 3° and 5° C. (5.4° and 9° F.). Closer application of the director did not seem to affect the temperature level, and there seemed to be no appreciable difference in the temperature levels to which skin, subcutaneous tissue, and muscle were raised. Superficial tissues cooled more rapidly than deep, and cooling was more rapid in intact animals than in those that had been anaesthetized. By means of an ingenious flowmeter the rate of blood flow in the femoral veins of the experimental animals was measured, and it was found that this was always increased by more than 100% when the limb was exposed to the radiations.

It appears then that use of microwaves marks a definite advance in the therapeutic application of heat. Much more accurate localization may be possible than at present, and the use of cross beams converging at a given spot must be considered. To describe this new form of physical medicine American workers have coined the word "microkymatotherapy," because so far as plain English went with the use of ever shorter wavelengths they had "run out of diminutives."

[1] *Proc. Mayo Clin.*, 1947, **22**, 209.

RISKS OF DICOUMAROL THERAPY

Thrombosis of the leg veins, with the pulmonary emboli which may follow, was shown by Belt[1] to be as frequent a cause of morbidity and death in medical wards as in surgical. The introduction by Crafoord[2] of heparin as a prophylactic against thrombosis led to a considerable reduction of thrombo-embolic complications in surgery. The cost of heparin, however, still remains almost prohibitive, and supplies are certainly nothing like adequate to allow its general use in the prophylaxis and treatment of leg vein thrombosis. For this reason other anticoagulants are being sought, and dicoumarol, which has the advantage that it can be given by mouth, is now being widely used. Dicoumarol prolongs the prothrombin time, and, though it takes about two days for this effect to develop, the first 48 hours can be conveniently covered by heparin.

One of the most important indications for treatment with anticoagulants is coronary thrombosis. If the blood can be prevented from clotting, the thrombosis may remain limited, intracardiac thrombi may not form, and pulmonary emboli, which frequently occur during the period when these patients are confined to bed, may be avoided. Glueck

[1] *Lancet*, 1939, **1**, 1259.
[2] *Acta chir. scand.*, 1937, **79**, 407.
[3] *Amer. Heart J.*, 1948, **35**, 269.
[4] *Schweiz. med. Wschr.*, 1947, **77**, 911.

and his colleagues[3] recently reported that in 44 control patients with coronary thrombosis thrombo-embolic complications occurred in 12, while in 44 treated with anticoagulants only 3 developed these complications. The mortality of the control group was 45%, while in those treated with anticoagulants it was 20%. Though these figures may not satisfy statistical demands, it is only by the accumulation of the results of careful clinical studies that final decisions will be reached on this important problem.

The mechanism by which dicoumarol interferes with the clotting process depends on its action in preventing prothrombin formation by the liver. The drug can only be given safely in hospital, as the margin between an effective therapeutic dose and a toxic dose is very narrow indeed. Furthermore, there is no easy way of standardizing dosage in any individual patient, and daily estimations of prothrombin time are necessary. There can be no relaxation of this precaution. Patients taking 200 mg. daily may retain a satisfactorily prolonged prothrombin time for ten days or a fortnight, and suddenly, without alteration of dosage, it is found that the prothrombin time has reached the danger level. Alternatively, in spite of keeping to the same dose, the prothrombin time may suddenly fall for no apparent reason, with the possible appearance of further thrombosis.

A recent report from Zurich by Koller and Pedrazzini[4] emphasizes the danger of uncontrolled dicoumarol treatment. A patient who had received 0.3 g. of dicoumarol daily for 14 days developed epistaxis, gross haematuria, and blood in the stools. Subcutaneous and subconjunctival haemorrhages, together with other purpuric manifestations such as positive capillary resistance test and failure of clot retraction, were also present. In spite of the administration of a vitamin K preparation no change took place in prothrombin time, and it was only after a week, during which several blood transfusions were given, that the patient ultimately recovered. Liver function tests were mostly negative during this period. This report is a useful reminder of the necessity for the strictest control of anticoagulant therapy. Fatalities are otherwise likely to occur, and the Zurich patient was fortunate to recover. Though dicoumarol seems to have earned its place in therapy at the moment, it is sincerely to be hoped that a safer anticoagulant will be found before long.

HEAT AND HUMIDITY IN OPERATING THEATRES

In a recent issue of the *Journal* Wynne[1] discussed the difficulties associated with heat and humidity in operating theatres, and propounded a simple formula for the calculation of atmospheric dryness. He referred to the sling, or whirling, hygrometer, which is used in America as the instrument of choice for scientific accuracy, and said that in England the usual open-air method is to expose wet- and dry-bulb thermometers in a Stevenson screen, while indoors the thermometers are simply hung in a room in comparative calm. His formula is based on the assumption that the wet-bulb thermometer is suspended in calm air. More recently Bell and Weir[2] have produced nomograms by means of which the relative humidity and the saturation deficit can be estimated readily from readings of the dry- and wet-bulb thermometers. These nomograms are suitable for use only when the wet-bulb temperature is that recorded by a thermometer suspended in calm air.

[1] *British Medical Journal*, 1947, **1**, 528.
[2] Ibid., 1947, **2**, 174.
[3] *Trans. Amer. Soc. heat. vent. Engrs.*, 1939, **45**, 161.

The speed of the air current passing over the bulb of a wet-bulb thermometer has a considerable effect on the temperature recorded by the thermometer, and when observations are made in a situation where the air speed varies the suspended type of hygrometer is a notoriously unreliable instrument. In calm air the wet-bulb becomes invested by a film of air which is more highly charged with water vapour than is the general atmosphere, and the wet-bulb temperature then recorded is erroneously high. However, if the instrument is so modified that air at a definite velocity is drawn past the thermometer bulbs it can be made to give reasonably precise readings. Satisfactorily ventilated thermometers are of two main types—the Assmann hygrometer, which needs no manipulation, and the whirling or sling hygrometer (or psychrometer). The nomograms of Bell and Weir are not suitable for a ventilated thermometer, but appropriate nomograms of similar construction could readily be drawn. There are available various psychrometric charts from which any desired measure of atmospheric humidity can be determined when the readings of a ventilated hygrometer are known. One such chart is depicted in the *M.R.C. War Memorandum No. 17*, and the supplement includes a reproduction on a large scale so as to facilitate accurate reading.

The authors referred to have been concerned with the humidity of the atmosphere, but the wet-bulb temperature is itself of considerable physiological significance. The interpretation in the light of recent physiological researches of hygrometric observations made in operating theatres must necessarily depend on the accuracy of the methods of measurement employed. Wynne emphasized the importance of the hazards to the patient of either hot and moist or cold atmospheres, and mentioned the risk of explosions due to high static electrical potentials in very dry atmospheres. He reported one instance in which a patient suffered adverse effects when the theatre temperature reached 81° F. (27.2° C.) and the air was very moist. In the *Annual Guide of the American Society of Heating and Ventilating Engineers* (1943) it is remarked that, while the conditions most comfortable for the operator are not identical with those most suitable for the patient, a compromise is usually not difficult to obtain with a relative humidity of 55 to 60% at temperatures between 72° and 80° F. (22.2 and 26.6° C.) (effective temperatures of 68° to 74° F. : 20° to 23.3° C.). In a study of the air-conditioning requirements of an operating room and recovery ward, Houghten and Cook[3] found that effective temperatures of 68° to 70° F. (20° to 21.1° C.) not only provided comfort for the operating-room workers but apparently prevented exhaustion of the patient. Charts for the estimation of effective temperatures are also included in *M.R.C. War Memorandum No. 17*, but it is worth noting here that in calm air effective temperatures of 68° to 70° F. represent dry-bulb temperatures of 71.5° to 74° F. (21.9 to 23.3° C.) at 60% relative humidity, and temperatures of one degree higher when the relative humidity is only 50%.

The accommodation at Cambridge for the Annual Meeting of the B.M.A. is limited. In order that the arrangements may run smoothly we would ask those who intend being present to notify the Executive Officer as soon as possible. The form for doing so appeared in the *Supplements* of April 24, May 8, and May 15.

The next session of the General Medical Council will open on Tuesday, May 25, at 2 p.m., when the President, Sir Herbert Lightfoot Eason, will take the chair.

THE WORKING OF A HEARING-AID CLINIC

BY

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Surgeon, Metropolitan Ear, Nose and Throat Hospital

The earliest hearing-aid was probably the hand held behind the ear, and ear trumpets and tubes go back at least 250 years. Non-electric aids, such as ear trumpets and auricles, magnify only to a slight extent—about 15 decibels—but this can be surprisingly helpful, especially to an elderly deaf person afraid of the mechanics of an electric aid. The first electric hearing-aid, which was in essentials a portable telephone, was made in 1898 in America by the Dictagraph Company; this was a micro-telephone type of aid which worked from a single low-tension battery and generally had a carbon granule microphone with a hard or soft carbon diaphragm. The micro-telephone apparatus was quite convenient to carry about, but amplification was confined to the lower notes, and so it was useful only to cases of conductive ("middle-ear") deafness and not to cases of perceptive ("nerve") deafness. In 1934 a new phase in the development of hearing-aids began with the invention in Britain (the Americans copied the idea later) of the radio-valve amplifier, using the 18-mm. type of valve. These instruments, although fairly large—rather like an old-fashioned box camera—were much more efficient than the micro-telephone type, as they could reproduce sounds over a wide frequency range. The year 1938 saw the development of the first real pocket valve-amplifier hearing-aid, employing a fairly large high-tension battery and the usual type of low-tension battery, which had to be carried in separate pockets or in a lady's handbag. During the war of 1939–45 there was a rapid development of new electrical equipment for military purposes, particularly miniature 10-mm. radio valves (used in certain types of fuses) and much smaller batteries with longer life. These lent themselves to incorporation in hearing-aids, which could therefore be made much smaller and yet give the same maximum efficiency. It was at this time that the American hearing-aid manufacturers overtook the British ones, as they were not subject to the same restrictions; but since the war British hearing-aids have recovered the lost ground, and in some cases surpass their American counterparts.

In this country, until quite recent years, the position regarding hearing-aids was a reproach to the medical profession, who were content in cases of intractable deafness to allow a deaf patient to go to one commercial firm after another until he found—or was persuaded that he had found—an aid that appeared to help his hearing. In 1929 the National Institute for the Deaf stepped in to help the deaf by drawing up an approved list of dealers in hearing-aids, who (with a few notorious exceptions) signed an agreement not to canvass, not to publish extravagant and misleading advertisements, to inform a client when no aid appeared likely to help, and to allow a reasonable home trial for a small fee. The Institute was not allowed by law to circulate a black list, nor could its approval of dealers' ethical methods cover approval of the particular hearing-aids which they sold, but it did what it could. In 1930 it set up a research committee in association with the London School of Hygiene and Tropical Medicine, and the late H. M. Wharry carried out investigations at University College Hospital on the value of the micro-telephone hearing-aids then available, employing the 4A gramophone audiometer. Mr. Wharry's preliminary report in 1932 was not followed up after his untimely death, though Dr. G. P. Crowden and the late Dr. Phyllis Tookey Kerridge did some valuable work with deaf school-children and the Medical Research Council published a report on the use of hearing-aids by Dr. and Mrs. Ewing and Mr. T. S. Littler. In 1937 the National Institute for the Deaf stimulated a new advance. At that time the only modern audiometers being used to help in the prescription of hearing-aids were in the hands of commercial firms, and to avoid this a well-wisher offered to present one to the Institute to set up a hearing-aid advice department. It was pointed out, however, by the Institute's Medical Committee that before being tested with an audiometer or trying a hearing-aid a deaf person should have his ears properly examined, for the deafness might be due to wax or suppuration or be relieved by Eustachian catheterization or other means, and that the suggested clinic should therefore be associated with a hospital.

An Important Service to the Deaf

The Metropolitan Ear, Nose and Throat Hospital started its Hearing-aid Clinic in the spring of 1937 in conjunction with one of the afternoon out-patient clinics. It was soon found to take up an inordinate amount of time, for the hearing-aid cases required special testing of hearing and the careful fitting of instruments, and for this reason it would probably have been dropped altogether but for the enthusiasm of the then almoner (now secretary), Miss Warshaw, who saw in a hearing-aid clinic a means of carrying out an important service to many deaf patients whom the otologists were inclined to dismiss as incurable. Even during the war years the Hearing-aid Clinic never stopped, although the hospital was bombed and its out-patient department was moved temporarily, first to Watford and then to new quarters at Granville Place, W.1. At this period the patients were first examined at the daily out-patient clinics by the honorary aural surgeon in charge, and when a hearing-aid seemed indicated audiometric tests were done by the almoner and suitable hearing-aids tried and fitted by her. For a time an assistant from a reputable firm of hearing-aid dealers came one evening a week to fit hearing-aids to referred patients; but experience proved that this was not a good method of getting an unbiased choice of hearing-aid, and it came to an end after a few months. At the beginning of September, 1945, when the hospital resumed its normal peacetime activities, the Hearing-aid Clinic was reorganized, with a staff of one full-time audiometrician and one trainee.

The Hearing-aid Clinic, which at present occupies four rooms, works to an appointment system, and is open every day from 9.30 a.m. to 5 p.m. (often later), except on Saturdays, when its hours are 9.30 a.m. to 12 noon. Every patient is first interviewed by the almoner and then examined by one of the aural surgeons in his out-patient clinic (unless he brings a recent letter from an otologist), who carries out an investigation of the history of the deafness and the reasons why a hearing-aid is wanted, as well as a routine examination of the ears, nose, and throat, tuning-fork tests, voice and whisper tests, Eustachian catheterization if necessary, and arranges such pathological or *x*-ray examinations as may be indicated. A deaf patient considered likely to benefit from a hearing-aid is then sent on to the Hearing-aid Clinic, where an audiometric examination is made, one copy of an audiogram being filed and one put with the out-patient case-notes. The rooms used for audiometric examination are ordinarily quiet comfortable rooms with furniture in them, not a specially built bare "silence-room"; this is emphasized because we have heard an otologist say that he was going to start a hearing-aid clinic when he could get a silence-room built—which may take a very long time in these days. A deafness research clinic has different objectives and requires different equipment from a hospital hearing-aid clinic—a "silence-room" is necessary at the former but not at the latter.

Training the Audiometrician

At the Metropolitan Ear, Nose and Throat Hospital we have trained our own audiometricians, and are training others. No one can do good audiometry without guidance, without experience, and without knowledge of the methods available and the problems to be met. Hallpike (1948) has said (in an *obiter dictum* at an otological discussion) that "it is not really necessary to create another branch of technical auxiliaries." On the other hand, the American otologists Lederer and Hardy (1946) wrote: "It is not good enough to assign the job [of audiometry] part-time to a medical secretary who knows no more about audiometric testing than to snap switches and turn dials. Every aspect of the work with the hard of hearing suggests the need for respecting the psycho-social behaviour of the patient, and good audiometry is no exception." And Carhart (1946) said that the interviewer who decides whether the patient is to be fitted with an air- or a bone-conduction instrument, and on which ear the aid is to be worn, "obviously must have wide training and experience." Our audiometricians are not taken from the nursing staff: it seems to us a waste, at a time when

there is a shortage of nurses, to assign a trained nurse to this work. They are well-educated (high-school standard) young women drawn to social work, who might, for example, have become hospital almoners or medical secretaries. The course has a duration of six months, and comprises training in making correct and reliable audiometric charts of the various types of deafness, in testing patients for suitability for hearing-aids, and in selecting the appropriate aid for the individual case; it includes attendance at the hospital speech therapy and lip-reading clinics. At the end of their course the students have to pass an examination in the basic principles of anatomy and physiology of the ear, the basic principles of acoustics, the physics of audiometers and hearing-aids and their mechanisms, the psychology of the deaf, the handling of deaf-mute children, and the principles of lip-reading; they must also have an adequate knowledge of medical terminology and of professional ethical conduct. It is stated on the certificate given after examination that the holder is not entitled to examine patients or fit hearing-aids except under the direction of a registered medical practitioner, and that any breach of this condition is contrary to the interests of the patient and will render the certificate liable to cancellation.

Testing by the Audiometer

Hallowell Davis, Stevens, *et al.* (1947) have stated, after extensive investigations, that it is a fallacy that hearing-aids, like eyeglasses, must be "fitted" to the detailed idiosyncrasies of the individual impairment, and that an audiogram does not help greatly in fitting a hearing-aid. We have found, as a result of our experience in the Hearing-aid Clinic, that when an audiometric examination shows a hearing loss of 30 to 40 decibels in the speech frequencies a hearing-aid becomes necessary, and a suitable aid should give a gain in speech reception of at least 50 decibels. The instruments of two years ago were not of much help with a loss of 50 decibels, but those of to-day are helpful in many cases with a loss of as much as 70 decibels. Hallowell Davis and Stevens believe that most deaf patients hear best with an aid that amplifies all the frequencies uniformly, and this conclusion is supported by the M.R.C. Committee on Electro-Acoustics, which found that the best results could be obtained with a uniform amplification of the sounds in the range of speech. We defer to these opinions, but we must say that the experience at our Hearing-aid Clinic is that in most cases either high or low frequencies have to be emphasized in the hearing-aids. It is noticeable that "nerve"-deafness patients, with a higher frequency loss, are often helped—in a way that would have been considered impossible a year or two ago—by modern aids that appear to boost the higher frequencies actually by cutting down the lower frequencies. Many cases that an otologist has diagnosed as "middle-ear" deafness because bone conduction for the 256 and 512 tuning-forks was markedly better than air conduction have been shown by the audiometer to be cases of "nerve" deafness, with marked hearing loss for the higher frequencies. Bone conduction, with masking, must always be tested with the audiometer as well as air conduction, and helps in differential diagnosis.

The audiometer is essential, not so much for the actual "fitting" of the hearing-aid, but as part of the clinical examination that gives the picture, as nearly complete as possible, of a case of deafness, and as a permanent record for later comparison. Audiometers must be regularly tested and correctly calibrated—we have four audiometers in our clinic, and one of them is usually away for calibration, retesting, or repair. In addition there is a gramophone audiometer for testing groups of children, and we have on order a "peep-show" (Dix and Hallpike, 1947, 1948) for testing the hearing of very young children.

There are now three full-time audiometricians in the Hearing-aid Clinic, and each tests the hearing and fits the patient with a suitable hearing-aid. The clinic has a "library" of hearing-aids, only those manufactured by firms on the "approved list" of the National Institute for the Deaf being included, though new instruments not on the list are tried out. The firms invited freely lend their latest instruments (we have had only one refusal, and one firm was excluded because it would not allow a discount for hospital patients), which comprise Acousticon, Amplivox, Auratone, Belclere, Bonochord, Compensator, Multitone, and Sonotone, several types of each being available. In addition there is a large variety of non-electrical instruments, comprising single and double auricles, ear-shells, speaking-tubes, and banjo-type, bell-type, cup-type, swan-type, and expansible trumpets.

The Fitting of Hearing-aids

The patient who comes to a hearing-aid clinic wants, above all, to hear and understand the human voice; other sounds, such as music or the door-bell or the general sounds around, are less important to the average deaf person. Speech should be intelligible but not uncomfortably loud, and if possible should have a "natural" quality. The frequencies necessary for the comprehension of speech range between about 250 and 4,000 cycles per second. It is not necessary for a hearing-aid, therefore, to provide for all the audible frequencies, but if they are cut off at 3,000 some consonants, such as f, s, and t, are inaudible and speech is difficult to understand; when cut off at 2,000 speech is incomprehensible. In fitting hearing-aids the audiometrician speaks sentences to the patient containing first words that are low in pitch (e.g., *wall, hole*), then of medium pitch (e.g., *king, name*), and lastly high in pitch (e.g., *bit, face*). Words are also spoken faintly and then loudly, and the volume control of the instrument is checked. When the patient has decided which instrument to take on trial, the audiometrician, by causing extraneous noises, shows him how to concentrate on hearing what he wants to hear and to ignore the extraneous sounds. He is told to wear the instrument at first only at home and not in the street, to get accustomed first to the new sounds of familiar persons and surroundings, and only gradually to be introduced to stranger and unexpected sounds.

All existing modern hearing-aids are basically similar; there are innumerable minor differences, but the electrical instruments used in the Hearing-aid Clinic all consist essentially of a microphone, an amplifier, and a receiver. Engineering compromises are unavoidable in the design and construction of a hearing-aid, for the objectives of low cost and light weight are definitely opposed to the objectives of high fidelity, high amplification, adequate power output, and long battery life. In the United States and Canada no deaf person now thinks of using any receiver other than a midget telephone receiver fitted snugly into the external auditory meatus with a moulded plastic insert; our experience is that the disk-type of receiver, with head-band, is more efficient than the moulded insert receiver, but because it is uglier and more uncomfortable nearly all the patients at the clinic demand the plastic moulded insert, and the audiometricians are instructed in making individual moulds. Bone-conduction receivers, which were popular with carbon microphone aids, have only a limited use with the valve type of instrument; this is because they give poor reproduction of sounds above 2,000 cycles per second and because a relatively higher electrical power is needed as compared with the ordinary receiver. Nevertheless a small number of deaf patients with good bone conduction do find that a suitable bone-conduction receiver (there are three types) applied to the mastoid gives a better result than a disk or insert receiver.

Secondary considerations are important to the patient: the instrument should not be too expensive either in initial outlay or in upkeep; it should be small and light in weight, easy to manipulate, comfortable to wear; and repair and replacement service and a supply of batteries should be reasonably available. Although hearing-aids are basically similar in their mechanism, it is surprising how a patient will pick out one particular instrument as much more suitable to him than any of the others—sometimes because of qualities that appear bad to the audiometrician, such as a raucous tone that "gets through" to him, or because an instrument is the most expensive (not the cheapest), or even because he prefers the colour of the case. The patient's work has to be taken into consideration—professional, clerical, manual, home duties, and also whether a portable aid is really necessary. The audiometricians are instructed, while giving every help in choosing the most suitable aid, to leave the final choice to the patient; it is bad psychology to appear to force any particular aid on the patient even when it seems to the audiometrician the most suitable; and, in addition, comfort in hearing is as important in making a choice as is clearness.

A "difficult" patient may be referred to the medical psychologist associated with the Hearing-aid Clinic, Dr. Hilda Weber, who also instructs and advises the audiometricians on the psychology of the deaf and on the proper approach to their problems; sometimes the psychiatrist on the staff of the hospital, Dr. Kenneth Hazell, is called in to help. It is a rule that all patients who have been fitted with a hearing-aid must be referred to the teacher of lip-reading or speech-reading on the staff of the hospital, Miss Sylvian Martin, who has two clinics weekly. Speech correction and lip-reading are essential auxiliaries to the hearing-aid—60% of words may be understood by the use of a hearing-aid alone, but up to 90% by combined hearing-aid and lip-reading. Older persons unfortunately find lip-reading more difficult to learn than do young people.

Grants to the Deaf

When an electrical aid is required and has been chosen the patient is carefully instructed in how to wear and how to use it; the type is then approved by the aural surgeon in charge of the case and the patient takes a note to the manufacturer, who supplies the specified aid on a week's (sometimes a fortnight's) trial. At the end of a week the patient returns and reports progress to the aural surgeon, consults the audiometrician about any difficulties in using the instrument, and then sees the almoner again with regard to its purchase. The manufacturers on the hospital list all allow a discount of 25% (15% on certain instruments), and the almoner assists the patient with advice about obtaining grants-in-aid. Some Approved Societies give grants, as do the Hospital Saving Association and other voluntary contributory schemes. The Royal Surgical Aid Society may give a grant, but "letters" from subscribers have to be obtained; the Hospital Saturday Fund, Church funds, and the Gentlewomen's Aid Society may help with grants; and some commercial firms or employees' organizations make grants from their benevolent funds—the railway-workers and printers' organizations have been particularly good. Some City companies, such as the Vintners, Curriers, and Clothworkers, have been helpful in giving grants in certain cases, and the Goldsmiths Company in particular has helped to provide many hearing-aids for Londoners through its fund, administered by the National Institute for the Deaf. Deaf-blind patients get help through the blind organizations; children suitable for hearing-aids can obtain them free through the educational authorities; and the Assistance Board gives grants in special cases. It is claimed by the hospital almoner that no patient requiring a hearing-aid has ever had to go without it on financial grounds. When the instrument has been purchased the patient is given careful instructions on how to look after it. All patients are seen again at the clinic after three months, and retested with the audiometer; in almost every case the hearing has been found to have improved owing to the stimulative effect of a suitable aid and to the improvement in the psychological outlook.

Some Results

The time taken up by each patient at the Hearing-aid Clinic, including preliminary examination, audiometric examination, and fitting with a hearing-aid, varies from one to two hours—certainly no patient ever takes less than an hour altogether. In spite of this, and of the care taken in fitting aids, an unexpectedly high proportion of the hearing-aids are returned after the week's trial. It was primarily to help reduce this wastage that a medical psychologist was attached to the Hearing-aid Clinic.

The reasons that are given for returning a hearing-aid vary: "Found it a nuisance"—did not switch it on and off as instructed; "Dared not wear it at work—would get the sack"; "Did not want to let everyone know I was deaf"—as if people wouldn't know already; "Too old to cope"; "Could not hear when several people were talking"—needed education in listening; "Could not hear in church or at the pictures"—difficulties of acoustics explained; "Felt everyone was looking at me"—further lesson given in wearing modern aid; "Anything on or in the ears worried me"; "Too dear to buy," "Too expensive to run"—in spite of help from the almoner; "Difficulty in obtaining suitable batteries"—this should have been only temporary; "Didn't think it worth the money"; "Wanted rather to have an operation to cure my deafness"; "Prefer to wait for the Government aid"—especially during the past six months.

In 1946, 355 electrical hearing-aids were recommended at the Clinic, and 170 of them were returned; 120 non-electrical aids were recommended, and 62 of them were returned. In 1947, 778 electrical aids were recommended, and 256 of them were returned; 53 non-electrical aids were recommended, and 28 of them were returned. It will be noted that the proportion of non-electrical to electrical aids has greatly diminished in the past year, and the reason for this seems to be the improvements in the valve-amplifier aids, which have made them more suitable for cases of "nerve" deafness. It has been suggested that the chief reason for the return of hearing-aids is their expense, and that the advent of the Government free hearing-aid will wipe out this wastage; but an endeavour has been made to show that the financial factor has not been an important difficulty in regard to the provision of hearing-aids in suitable cases, and when the Government aid is available lack of choice may well be an additional factor in patients returning (or giving up using) hearing-aids. This wastage at our Hearing-aid Clinic has given us a certain amount of sympathy with the commercial dealers, who have argued that insistence on a preliminary trial has increased their costs and immobilized a large proportion of their stock of instruments.

There is no doubt that more time should be spent—if only it could be spared—on training patients to get accustomed to the selected hearing-aid and in listening to different sounds (songs, orchestral music, voices) and to different individuals and groups. We envy the United States War Veterans' Organization when we read that *five weeks* are spent in residence at Deshon, Philadelphia, and similar centres in selecting hearing-aids and training the patients to use them properly—with the result that only 5% of the instruments are returned.

Conclusions

The modern valve-amplifier hearing-aid has improved greatly in the past two years, and is able to help many cases of perceptive ("nerve") deafness as well as most cases of conductive ("middle-ear") deafness. It will probably be a still better instrument within the next five years.

The provision of a suitable hearing-aid is only part of the rehabilitation of a deaf person, and adequate training in its proper use is necessary. Training in lip-reading should always be combined with the use of a hearing-aid, and "difficult" deaf patients are often helped by a medical psychologist. Every hospital ear, nose, and throat department should be associated with a hearing-aid clinic—of which at present there are only 19 in Britain, and some of these consist in a hearing-aid dealer making periodical visits.

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The Ministry of Labour and National Service, in conjunction with the Ministry of Health, is sending three mobile nursing exhibition vans on tour in different parts of the country to encourage recruitment to the nursing and midwifery professions. The vans are fitted out partly as an exhibition with photographs, a nursing panorama, a skylight view into a model operating theatre, and a display of surgical instruments, and partly as an interviewing room in which persons interested—young people, parents, teachers, and others—may ask about pre-nursing courses, opportunities for training, salaries, or other points about nursing and midwifery. A technical nursing officer of the Ministry of Labour will be available to give advice and information.

FIG. 1.—Exploration of ulnar nerve showing fusiform neuroma.

MEDICAL PHOTOGRAPHY

The first exhibition of medical photography to be arranged by the Medical Group of the Royal Photographic Society can be seen at the Royal Society of Medicine, 1, Wimpole Street, W.1, from Monday, May 24, to Saturday, May 29. There are many outstanding photographs and coloured transparencies. The photographic departments of most of the larger hospitals are well represented. We reproduce on this page two of a series of three photographs taken by Miss Margaret Crossley in the department of orthopaedic surgery of the Wingfield-Morris Hospital at Oxford. Several photographs have been taken with infra-red rays and show the superficial veins, notably in lactation and in cases in which a collateral circulation is evident. Many of the photographs are of rare or unusual cases, and there are some excellent photomicrographs. A dramatic picture of a case of anorexia nervosa is reminiscent of the Belsen "horror" photographs. Unusual items are the self-portrait of a radiologist; a picture of a celluloid cast of the blood supply to the stomach; and an enormous enlargement of a glomerulus. Perhaps the dermatologists and the ophthalmologists have contributed most to this exhibition, but there are a number of entries from gynaecological and dental departments, and almost every specialty is represented.

Medical Group

Previously medical photography had been treated as part of the province of the Scientific and Technical Group of the R.P.S., but in April, 1946, with the guidance of Mrs. Rosalind Maingot, F.R.P.S., the Medical Group was formed under the chairmanship of Sir Cecil Wakeley. The Group now has 153 members. For the present exhibition, which it is hoped will become an annual event, some 300 prints and 150 transparencies, the majority in colour, were submitted by 85 photographers, either hospital departments or individuals. Of these entries 150 prints, 75 transparencies, and 6 films and filmstrips were accepted by the judges.

The Medical Group responsible for this exhibition is very active and has already contributed a number of papers to the proceedings of the Royal Photographic Society. It also circulates among its members two portfolios which allow all of them to see the best current work in different branches of medical photography. The interest taken in this subject has recently been revealed in our correspondence columns, where a sharp division of opinion has been reflected. Dr. ffrangcon Roberts in an article in our opening pages (March 13) criticized the expansion of departments of medical photography. He has since been taken to task by some of our correspondents and supported by others. The debate continues in this issue at page 1001.

The photographs on exhibition at the Royal Society of Medicine will probably help to confirm both parties to the argument in their original views. There are some sets of photographs and transparencies of undoubted value for teaching purposes. There are also a large number of rarities which are photographically impressive, of interest to those originally concerned with the case in question, but of little or no general interest. At the same time the exhibition will allow medical men to see what assistance may be expected from the medical photographer in keeping records and in teaching.

Visual methods of instruction are being increasingly applied, and however views may differ on the limitations of medical photography this exhibition will at least serve to show the high standards which have been achieved technically. Noteworthy in this connexion are some of the photographs showing diseases of the eye.

September Exhibition

It should perhaps be recorded here too that the Royal Photographic Society will hold its 93rd Annual Exhibition at the Society's house at 16, Prince's Gate, S.W.7, during September and October. In the second part of the exhibition, which will be devoted to scientific, technical, nature, and record photography, the Medical Group will again have an opportunity to compare its own standards with those achieved by photographers working with subjects in the allied sciences. There will be a medical and surgical section, and medical and industrial radiographs will be judged separately. The scientific section of this annual exhibition always endeavours to show exhibits which illustrate the use of photography for obtaining information which cannot be secured in any other way.

FIG. 2.—Cavity in which nerve was densely adherent.

WORLD HEALTH ORGANIZATION

WORK OF THE INTERIM COMMISSION

The International Health Conference held in July, 1946, adopted a constitution for the World Health Organization which provided that it would come into force once 26 members of the United Nations had become parties to it. On April 7, with the ratification of its constitution by Mexico and Byelorussia, the World Health Organization came into being as one of the Specialized Agencies of the United Nations.

The first World Health Assembly will be convened at the Palais des Nations, Geneva, on June 24 and is expected to continue to the end of July. Delegations will be present from at least 35 nations—27 U.N. members and 8 non-members. The United States and France are the two major powers which have not yet ratified the W.H.O. constitution. In the case of the United States the Bill for ratification passed the Senate last year and had been unanimously approved in the House Foreign Relations Committee. However, the House of Representatives Rules Committee tabled the Bill by a vote of five to two. The United States has shown only slight hesitation in voting funds to the eight other specialized agencies of the United Nations. Unfortunately this Bill, which it was hoped to pass during the last Congressional session, was frozen out by more immediate problems.

W.H.O. has brought under one control the functions shared previously by the Office International d'Hygiène Publique in Paris, the Health Organization of the League of Nations in Geneva, and the Health Division of Unrra. Since July, 1946, all essential international duties have been carried out by the Interim Commission of W.H.O. The Interim Commission has managed the fund for the award of fellowships to medical specialists from war-devastated countries. It has embarked on a large public health and training programme in China. It also co-operated successfully with the Egyptian public health authorities in dealing with the recent cholera epidemic. A great deal has been written about this epidemic, but there is one point that has rarely been mentioned. Our American correspondent writes:

> "When the news of the epidemic first reached this country it appeared to stimulate the business rather than the humanitarian instincts of certain of the pharmaceutical companies, and the price of anti-cholera vaccine rose to 8 cents per ml. By dint of investigations and discussions the secretariat of the Interim Commission succeeded in completing arrangements with two drug firms for the manufacture of the vaccine at a price of 2 cents per ml. They very wisely gave full publicity to these more public-spirited manufacturers and it is hoped that this will act as a stimulus to straight dealing when next the need may arise."

Expert Committee on Tuberculosis

At the fifth session of the Interim Commission held in Geneva early this year the first report of the Expert Committee on Tuberculosis was accepted for submission to the World Health Assembly. The Expert Committee, which consisted of only three members, called attention to the fact that the fight against infectious disease was a task for the whole of humanity. Fortunate and relatively healthy nations must come to the aid of stricken nations in order to help eradicate tuberculosis. The Expert Committee listed eleven principal "techniques" for tuberculosis control: (1) the determination of the extent of the problem in each country; (2) the recruitment and training of professional personnel; (3) the provision of physical facilities, supplies, and equipment; (4) health education; (5) the demonstration of practical activities in the field by well-trained teams; (6) the distribution of financial grants when necessary; (7) the development of uniform procedures in tuberculosis research; (8) the co-operation of all international organizations concerned with tuberculosis control; (9) the eradication of tuberculosis in cattle; (10) the study of the legal and epidemiological aspects of the problem of tuberculosis; (11) the review every year by the World Health Organization of the efficacy of its programme for the control of tuberculosis.

The Expert Committee on Tuberculosis is only one of eleven similar committees set up by the Commission. The others are concerned with international epidemic control; revision of the pilgrimage clauses of the international sanitary conventions; quarantine; yellow-fever; habit-forming drugs; the sixth decennial revision of the international lists of diseases and causes of death; biological standardization; unification of pharmacopoeias; malaria; and venereal diseases.

World Health Assembly

The first World Health Assembly will receive the reports of these expert committees. It is expected that the Interim Commission will be dissolved soon after the adjournment of the Assembly. The agenda also includes the selection of a Director-General for W.H.O. and of a permanent site for the organization. A number of nations have already declared a preference for a permanent site. Geneva heads the list, with New York, Paris, Washington, and London as successive choices. In the House of Commons recently Mr. Bevan said that he was considering whether it would be possible to offer accommodation in London for the 1949 World Health Assembly. The proposed budget for 1949 amounts to $6,387,995, which is more than twice the Interim Commission's budget for the first year of its work. The largest single sum, $1,071,690, is allotted for fellowships, medical literature, teaching equipment, and emergency medical supplies.

One of the most important functions of W.H.O.—"medical co-operation with accredited governmental and non-governmental agencies"—is the subject of a recommendation of the fifth session of the Interim Commission. The recommendation was that the Assembly should adopt the draft agreements drawn up by the Interim Commission with several U.N. Specialized Agencies. "These agreements provide that the W.H.O. shall serve in an advisory capacity in the fields of public health and medicine with the following organizations: the International Civil Service Advisory Board, the U.N. Social Commission, the U.N. Scientific Conference for the Conservation and Utilization of Resources, International Labor Organization, Unesco, and Food and Agricultural Organization."

In this connexion the apparently long delay in obtaining sufficient ratifications may prove to have been of value. Other specialized agencies of the United Nations achieved a permanent position soon after its creation. There has been a growing body of criticism of some of these agencies on the grounds that they have sponsored projects which are unnecessary, unripe, or outside the real sphere of their activity. These errors were easy enough to fall into in the early enthusiasms of the infant United Nations, and a much more deliberate start may well have saved the first World Health Assembly from such pitfalls.

Meanwhile the Interim Commission in its closing stages can look back on a record of progressive work unspoiled by lack of international co-operation. When the Commission is dissolved by the World Health Assembly its chairman, Dr. Andrija Stampar, of Yugoslavia, Dr. Brock Chisholm, of Canada, the executive secretary, and their colleagues will be able to congratulate themselves on achieving over a period of nearly two years an international outlook and a degree of international co-operation and amity which might well be copied by other delegates of the United Nations in the political field.

NEW LOOK FOR HEALTH

At the Health of the People Exhibition, which was opened in London last week by Princess Elizabeth, the Central Office of Information and the Ministry of Health have attempted to give health a new look. Their efforts have met with considerable success, for the exhibits are well designed and attractively displayed. The purpose of the exhibition is to mark the centenary of the first Public Health Act of 1848, and to record the progress that has been made since then in improving public health, leading up to the inauguration of the National Health Service later this year. In one section the spectator is confronted with a series of questions about the new health service, and is invited to press buttons to learn the answers. One of the questions is "Will Doctors Be Civil Servants?" When the appropriate button was pressed a light flashed in an empty panel—plainly a case in which the quiz-master was baffled by his own question.

At exhibitions of this kind there is a danger of so overwhelming the spectators with a mass of pictures, models, and graphs that they go away with only a confused impression of what it was all about. Skilful display counteracts this to some extent, but it was significant that on the day the exhibition opened the greatest interest was being shown in laboratory work actually being carried out in full view of spectators. In fact, there was a queue of people waiting to have their blood groups tested. The romance of Science obviously does not extend to graphs and statistics, nor to water supplies and drains.

"Visual Aids" are now very much in the fashion among educationists, and the use of films and film-strips in popular health education is certain to increase. At the Health of the People Exhibition some of the latest educational health films are being shown. One of these, "Modern Guide to Health," is a cartoon produced by John Halas and Joy Batchelor, who have been highly praised for their work by the professional film critics. Simple common-sense advice about posture, exercise, clothes, and sleep is given an original twist by the freshness of the drawings and the cleverness of technique. The same technique makes the cartoon, "Your Very Good Health," well worth seeing, but this film is frank propaganda for the National Health Service Act, and so far from being instructional might even be considered misleading.

In the future much more thought, time, and money will be spent on health education than hitherto. Prof. Andrew Topping has recently said, "I am firmly convinced that education is the greatest single factor in achieving results in the health field . . . in the promotion of health we must have a prepared and receptive community."[1] The speed with which knowledge about health and disease can be applied depends largely on the state of public opinion. With the Health of the People Exhibition the Ministry of Health has set a useful example to local health authorities, which after July 5 will be responsible for health education.

TRAVELLING FELLOWSHIPS IN MEDICINE

The Medical Research Council invites applications for the following Travelling Fellowships for the academic year 1948–9 :

Rockefeller Medical Fellowships

These Fellowships are provided from a fund with which the Council has been entrusted by the Rockefeller Foundation of New York. They are intended for graduates resident in this country who have had some training in research work in clinical medicine or surgery, or in some other branch of medical science, and who are likely to profit by a period of work at a centre in the United States or elsewhere abroad, before taking up positions for higher teaching or research in the United Kingdom. The stipend will ordinarily be at the rate of £525 per annum for a single Fellow, and of £800 per annum for a married Fellow. Travelling expenses and some other allowances will be paid in addition.

Dorothy Temple Cross Research Fellowships in Tuberculosis

These Fellowships are awarded by the Council from a special endowment of which it is the trustee.

The object of the Fellowships, as defined in the trust deed, is to give special opportunities for study or research to suitably qualified British subjects of either sex "intending to devote themselves to the advancement by teaching or research of curative or preventive treatment of tuberculosis in all or any of its forms." The Fellowships will, as a rule, be awarded to candidates who wish to make their studies or inquiries elsewhere than in the United Kingdom. They will ordinarily be awarded for one academic year, and provide for the payment of stipend, together with an allowance for travelling and incidental expenses. The stipend will ordinarily be at the rate of £525 per annum for a single Fellow, and of £800 per annum for a married Fellow.

Completed applications for Fellowships of either type must be lodged with the Council by June 1. Further particulars and forms of application are obtainable from the secretary, Medical Research Council, 38, Old Queen Street, Westminster, London, S.W.1.

[1] *J.R. sanit. Inst.*, 1948, **68**, 193.

IMPERIAL CANCER RESEARCH FUND

ANNUAL REPORT

The forty-fifth annual report of the Imperial Cancer Research Fund was presented to the annual meeting held at the Royal College of Surgeons on April 21 with the Earl of Halifax, president of the Fund, in the chair. The Fund continues to be well sustained by the gifts of the public. Last year these amounted to £14,000—an increase of £10,000, due to a single donation of that amount. The public support is the more noteworthy because to the bulk of people these annual reports must be as remote as if they were written in one of the less familiar foreign languages.

Several members of the scientific staff have been engaged since 1939 in the study of Bittner's milk virus of mouse mammary cancer, but it is admitted that it is difficult to feel absolute confidence in the conclusions so far reached. There are some indications that infection of the mouse with the milk virus occurs by way of the lymphatics of the nasopharynx, but those concerned are hesitant to draw this conclusion because of certain experimental difficulties.

An investigation of spontaneous mammary tumours in the mouse is proceeding on the hypothesis that spontaneous mammary cancer is dependent upon the combined action of three factors—an inherited tendency, the action of oestrin, and the presence of a virus. Experimental animals have been obtained by mating low-cancer-line females with high-cancer-line males, and in certain matings of this kind the hybrids have been found always free from mammary cancer. Experiments reported previously had indicated that adenomas in mouse mammae might be regarded as evidence of the presence of the milk factor of mammary cancer, provided that no amount of oestrogen detectable by vaginal cornification was present in the mice bearing the adenomas. An account is now given of further work in this field, which, however, has not yet reached any decisive conclusions. Quantitative data are urgently called for in the many problems involving the use of the mouse mammary gland.

Some work on the action of thiol compounds in the induction of skin cancer in mice by synthetic carcinogens is almost completed. The anti-carcinogenic property of BAL, the most potent thiol used, has been found to be much lower than its therapeutic properties in arsenical poisoning. All the thiol compounds tested, in particular BAL, are less potent as inhibitors of skin tumour induction than such substances as bromobenzene or maleic anhydride.

One of the members of the scientific staff has been engaged in a critical study of the situation in the field of viruses in relation to cancer, but this work also is not sufficiently advanced to justify a report of the findings. One problem that has arisen may be mentioned. It has been found desirable to preserve active homogenized stocks of transplantable tumours for comparative and quantitative studies. Forty years ago Salvin Moore successfully transplanted mouse carcinomata and sarcomata after exposure to the temperature of liquid air, and other workers have grown sarcomata after freezing them with CO_2 snow. The general conclusion has been that it is possible for a few cells to remain viable though exposed to freezing temperatures, and certain aspects of this problem are now being studied with the immediate objective of further improving this potentially valuable method of preserving certain transplantable tumours.

Another continuing investigation concerns the action of chemical substances on cancer. As yet no compound examined has shown a specific lethal action on cancer cells. The members of the scientific staff at Mill Hill under the Director, Dr. W. E. Gye, number eight, with one visiting research worker.

Sir Harold Gillies, consultant adviser to the Ministry of Health and Scottish Department of Health, left Britain on April 24 for a 3-weeks tour of Yugoslavia under British Council auspices. He gave lectures and demonstrations on plastic surgery at Belgrade and in provincial centres. Sir Harold is already well known in Yugoslavia, for in 1946 he was leader of the Unrra plastic surgery team there.

Preparations and Appliances

A "TRILENE" BY-PASS TAP

Dr. A. H. GALLEY, assistant anaesthetist to King's College Hospital, writes: It is now generally accepted that trichlorethylene ("trilene") must not be used during closed-circuit anaesthesia owing to the possibility of the formation of breakdown products which can produce cranial-nerve palsies. Until Marrett (*Journal*, Feb. 28, p. 403) introduced his apparatus a few weeks ago, however, there was no anaesthetic machine on the market with a safety device to prevent the use of trilene when the absorber circuit was in operation. For some time I have been engaged in designing a simple attachment which could be incorporated into a Boyle apparatus—the most popular anaesthetic machine—to achieve this object. As will be seen from Fig. 1, it consists of a by-pass tap; and Fig. 2 shows how it can be incorporated between the ether and trilene bottles (the rubber tube cut short in Fig. 2 would normally be connected to the CO_2-absorber circuit). When the tap is turned to the left ("absorber" position) the gases from the flowmeters and ether bottle are short-circuited to the CO_2 absorber by a permanently attached rubber tube (cut short in the photograph), thus by-passing the trilene bottle and preventing the possibility of this anaesthetic from gaining access to the closed circuit even if the trilene tap is inadvertently left "on." When the by-pass tap is turned to the right ("open" position) the machine can be used in the usual manner with the Magill semi-open rebreathing-bag assembly.

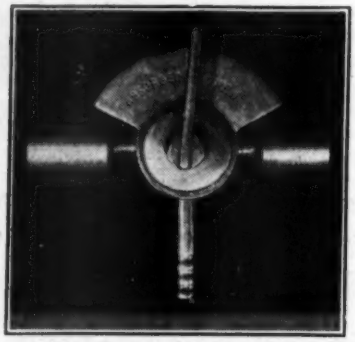

FIG. 1.—The by-pass tap.

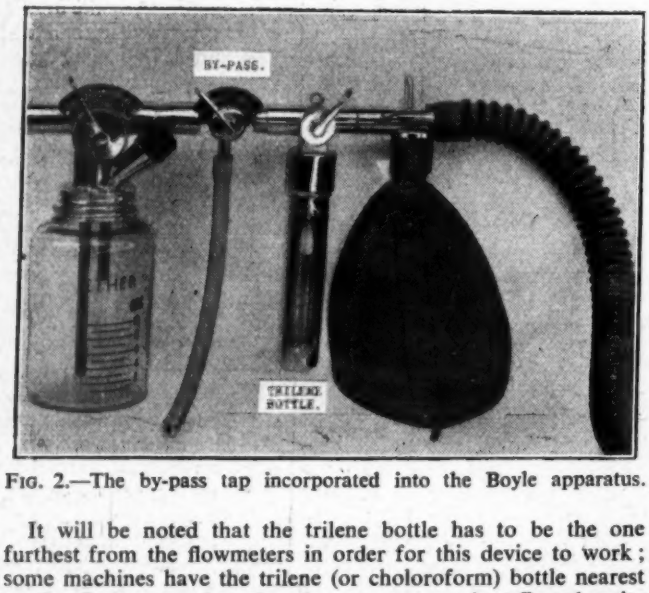

FIG. 2.—The by-pass tap incorporated into the Boyle apparatus.

It will be noted that the trilene bottle has to be the one furthest from the flowmeters in order for this device to work; some machines have the trilene (or choloroform) bottle nearest to the flowmeters, but the change-over can be effected quite simply by unscrewing and interchanging the glass containers for ether and trilene. Fortunately, Boyle's apparatus is usually built on the unit system—i.e., flowmeter unit, ether-bottle unit, etc.—and the by-pass tap has been designed as a small unit which readily fits into place (Fig. 2). The tap illustrated has been made for me by Medical and Industrial Equipment Ltd., of 12, New Cavendish Street, London, W.1, to fit their own machine, but they are able to supply a similar tap to fit any Boyle's apparatus designed on the unit system.

Reports of Societies

HYPOTHALAMUS AND WATER METABOLISM

In the Section of Endocrinology of the Royal Society of Medicine on April 28, with Mr. L. R. BROSTER in the chair, the subject under discussion was the hypothalamus and water metabolism.

Dr. G. W. HARRIS said that it was possible for the hypothalamus to influence water metabolism through the sweating mechanism, through vasomotor control, and through the pituitary gland. He confined his remarks to the effect exerted by the pituitary. Both the posterior and anterior pituitary affected water metabolism. It had been shown many years ago that the intravenous injection of posterior pituitary extract decreased the urinary flow. He described experiments with rabbits to ascertain the effects on the diuretic process of stimulating the pituitary stalk: there was an abrupt diminution in the urinary output and this antidiuretic effect was maintained for a long period. The extent of this inhibition varied according to the position of the stimulating electrode in relation to the hypophyseal tract and the intensity of the stimulation. As the urinary output fell the relative chloride output increased. As urinary output recovered, the chloride secretion fell. Most of the endocrine glands seemed to be under nervous control. The position would be clearer if it were possible to demonstrate how the nervous system affected the secretion of the anterior pituitary.

Dr. W. J. O'CONNOR described some recent work carried out by Prof. Verney on dogs, the results of which showed the effect on diuresis of changes in the osmotic pressure of the blood in the carotid arteries.

Clinical Significance

Dr. RAYMOND GREENE drew attention to the clinical significance of these experiments. Before he knew anything about the early work of Prof. Verney and his collaborators he was impressed by the fact that extreme and prolonged anxiety in human beings did not, as was often asserted, give rise invariably to loss of weight. He had collected a series of cases in which anxiety had apparently produced a sudden and rapid increase of weight, which was in his view due rather to water retention than to true obesity. He outlined the case of a woman who was married in 1939, when her weight was 56 kg. Her husband went abroad and was missing at Singapore. As soon as the news of the tragedy reached her she began to put on weight. She was treated by a low carbohydrate diet without avail, and then with a diuretic in addition. Her weight fell slightly but did not return to its normal level. She was taken into hospital, where her weight again fell, but as soon as she went back to her job it rose again. After about a year she formed a new attachment and forgot about dieting. Her mental health improved, and her weight in a very short time went down to normal. He thought that this was an example in clinical medicine of what might be called Verney's syndrome. In response to anxiety there was an increase in the output of antidiuretic substance from the posterior pituitary and an increase in weight, which was usually taken to be obesity, but was in fact an accumulation of fluid in the body.

In the course of the discussion which followed one member asked how nervous polyuria fitted into this picture, and another whether the posterior pituitary had any effect on salivary flow. Another question was, Could this work be applied to nocturnal enuresis in children, who had water retention during the day and at night an uncontrolled polyuria. Dr. Raymond Greene said that he felt sure that the suggestion concerning enuresis was correct. He had asked mothers who brought such children to him about the colour of the urine passed during the night, and in a fair proportion of cases, though not in all, the mothers had been struck by the fact that, whereas the child passed a deeply coloured concentrated urine during the day, the urine

passed at night was so free from colouring matter that the sheets were not stained.

Dr. O'Connor said that in the experiment he had described all the dogs had been subjected to what was in effect a sympathectomy. The operation was designed to prevent nervous influences acting on the kidney. If an emotional stress was produced in a normal dog an increase in the production of antidiuretic substance was the exception rather than the rule, whereas in the partially sympathectomized dog there would be an increase. That might be of interest in connexion with nervous polyuria in that nervous excitement was not necessarily associated with increased output. He knew of no convincing evidence that the amounts of antidiuretic substance had any effect on salivary flow.

LEMPERT FENESTRATION OPERATION

RESULTS IN OTOSCLEROSIS

Dr. JULIUS LEMPERT, of New York, addressed an unusually crowded meeting of the Section of Otology of the Royal Society of Medicine on May 7 on his fenestration operation for the restoration of hearing in clinical otosclerosis. He showed a colour film, which ran for nearly an hour, illustrating every detail of the operation. His remarks were based upon a continuous study and analysis during the past ten years of the results of 3,700 fenestration operations, of observations made in the performance of 450 revisions, and of the histological findings in animal experiments.

Pre-operative and Operative Factors

Dr. Lempert said that, while it was important to have pure tone audiometer tests both by air and bone conduction, these must be supplemented by the tuning-fork (512, 1024, and 2048 d.v.) and voice tests. No otologist should ever perform a fenestration operation without first personally testing the patient to determine the chances of restoration of practical hearing. He should never work on the findings of another otologist. Only the development of simple uncomplicated tests would be acceptable in the long run. If following a well-perfomed fenestration operation an impressive improvement in hearing could not be demonstrated audiometrically, it might be assumed that the cochlear functional reservoir was incorrectly evaluated pre-operatively.

The creation of a new vestibular fenestra to replace the functionally impeded oval window resulted in improved mobilization of endolymph by air-borne sound, which in turn could result in restoration of practical hearing, if the existing cochlear nerve function was adequate. A tympanic air space hermetically sealed by the tympanic membrane was essential following fenestration so that the endolymph could be mobilized by air-borne sound out of phase. The newly created vestibular fenestra must be sealed by a viable tympano-meatal flap to protect the membranous labyrinth from degeneration, which would lead to a total loss of hearing.

Post-operative Factors

The danger of post-operative infection had been largely overcome by the use of systemic penicillin. As a result of experience gained with revisions and animal research it had been found that osteogenetic closure of the fenestra was mainly influenced by (1) the site chosen for the creation of the fenestra, (2) the inherent natural tendency for osteogenetic repair to take place in the freshly injured histological bony layer of the fenestra rim, and (3) bone dust and bone slivers left behind in the region of the fenestra gap and within the perilymphatic space.

He spoke in particular of these bone particles, which, if they were not meticulously removed, would endanger the result of the operation. Every careful otologist practising fenestral surgery must have observed that in fracturing and pulverizing this region bone dust and splinters unavoidably fell into the perilymphatic space and were irretrievable. He was convinced that they were a much more serious threat to the maintenance of practicable serviceable hearing as a result of fenestral surgery than bone dust and splinters resting in the region of the fenestral rim. His new technique had been developed with a view to preventing the creation of bone splinters and bone dust, and he illustrated pictorially how by working with a burr the bony capsule was slowly and gradually worn down and bone dust prevented from falling within the space.

Assessment of Results

Careful post-operative testing by pure tone audiometry and its comparison with pre-operative audiometric readings was the most scientific method of evaluating the results obtained. A patient's statement that his hearing was improved following operation was acceptable only when it could be audiometrically substantiated. There was no clinical evidence of secondary cochlear nerve changes in these cases, but as such changes had only rarely been observed in the non-operated ear of the patient the conclusion that the operation prevented such changes could not as yet be drawn. Following the successful performance of the fenestral operation in one ear an improvement of hearing in the non-operated ear had never been observed.

Finally Dr. Lempert said that the balanced technique whereby the fenestra was created in the dome of the vestibule when carefully performed could result in the restoration of permanent, serviceable, unaided hearing, acceptable both to the otologist and to his patient, and there was evidence that the "bone-dust-free nov-ovalis" technique would prove to be another successful advance. He then showed by means of his film the entire technique of the operation, from the pre-operative examination of the patient to her return to the consulting-room three weeks after operation for demonstration of what appeared to be a perfect result.

Permanence of Results

No time was left for discussion, but Mr. TERENCE CAWTHORNE, Mr. SIMSON HALL, and the President of the Section, Mr. DONALD WATSON, joined in tributes to the lecturer and raised a few further points, to which Dr. Lempert replied.

Dr. Lempert said that of 100 found suitable for this operation 80 would be found immediately after operation to have had their hearing restored to the practical level for the three speech frequencies, but after two years only 60 of those 80 would be found to have maintained such hearing. In other words, 75% of those who had been successfully operated on showed the permanent result of good unaided hearing. This percentage might be increased when the cases in which bone dust had been avoided came to have their results assessed. It was necessary for the patient to stay in bed for about five days after operation; the patient could leave hospital in ten days, and a week afterwards should be going about his affairs as usual.

To avoid post-operative infection the most satisfactory means was to promote rapid healing. In the ordinary way with prompt skin grafting there should be a dry and completely healed cavity within three weeks. But there were cases which would stay dry for a while and then begin to desquamate. Some mild staphylococcal infection might occur. He had tried many things. Sulphathiazole powder answered in some cases, but not in all, and the same was true of sulphadiazine, gentian violet, and plain boric acid. The worst thing to use was silver nitrate.

In submitting patients to this treatment, Dr. Lempert continued, regard must be paid to the importance to them of unaided hearing. Quite 80% of the deafened people who came to him wore hearing-aids and could hear very well with them, but they wanted operation in order that their infirmity might not be apparent. They did not want to be seen with a "crutch," and therefore they submitted to the fenestration operation. But if they could make their social and economic contacts satisfactorily with a hearing-aid there was no justification for the operation.

SOCIAL MEDICINE

The Section of Epidemiology and State Medicine of the Royal Society of Medicine, with the president, Dr. W. S. C. COPEMAN, visited the Institute of Social Medicine at Oxford on April 23. The director, Prof. J. A. Ryle, welcomed the visitors in an introductory address in which the aims and organization of the Institute were described. The afternoon session was devoted to short communications by members of the scientific staff and to demonstrations of modern mechanical methods for recording and analysing statistical data.

Industrial Accidents

Dr. W. T. RUSSELL dealt with industrial accidents, primarily from the statistical aspect. The importance of well-designed record cards and of co-operation between operatives and supervisors in reporting all accidents, however trivial, was stressed. Before 1921 statistical records were on an industrial rather than an occupational basis, with the result that high-risk operations might be diluted or even masked by being placed in the same category as low-risk operations in the same industry. Although occupational morbidity figures tended to be influenced by selective recruitment on account of aptitude or fitness for particular types of work, they were generally more reliable than mortality rates. The old and the unfit tended to seek lighter work, and only the last occupation was recorded on the death certificate.

Despite recent improvements, due partly to legislation and partly to voluntary effort, industrial hazards remained an important factor in loss of production, with 230,000 recorded accidents and 826 fatalities in England and Wales in 1946. In a recent survey the accident and sickness records were correlated and compared at different age groups. The rates were much higher than the averages at ages under 20 years and continued to decline even after the age of 50.

Details were given of an investigation by Drs. A. M. STEWART and J. P. W. HUGHES into the incidence of tuberculosis in the boot and shoe trade in Leicester and Northampton, which is approximately twice as high as in comparable groups in other industries in these areas. This was known as long ago as 1915, when the first M.R.C. report on the subject was published. With the aid of mass radiography and detailed analyses of the collected data according to age, job, and environment, valuable conclusions emerged. Although there was little evidence to show that leather or other materials were contaminated, the homes and the working conditions in the smaller factories were far from satisfactory.

The effect of excessive fluorine in the water supplies in certain areas on the incidence of dental caries and fluorosis and on the aetiology of juvenile osteochondritis (Scheuermann's disease) was discussed by Drs. F. H. KEMP and D. C. WILSON, who showed specimens and radiographs. An animated discussion followed on the papers and on different aspects, present and projected, of the work of the Institute.

The building up of local health services of a uniformly high standard throughout London should be one of the benefits of the National Health Service, declared Mr. John Edwards, Parliamentary Secretary to the Ministry of Health, when he opened the Caversham Road Day Nursery, St. Pancras, London, recently. In London maternity and child welfare and school health services were at present subject to a patchwork of controlling bodies. The services were interrelated and should be under a common control. That was one of the things which the National Health Service Act brought about. From July 5 the L.C.C. would be responsible for providing all those services. That, besides enabling the highest degree of co-ordination to be obtained, would make possible the building up of local health services of a uniformly high standard throughout the country. Continuity of the health services for children would be secured from infancy onwards, since the County Council was both the local health authority and the local education authority. But the L.C.C. had wisely recognized that it was important that the management of those domestic health services for which they were to be responsible should not become remote and impersonal, and that the metropolitan borough councils should be linked with the work. For those reasons the County Council had decided to entrust the day-to-day management of the services to divisional health committees, of which there would be nine, each covering a section of the county.

Correspondence

Erythroblastosis and Kernicterus

SIR,—According to the annotation on this subject (May 1, p. 843) based on a paper by Wiener and Brody, icterus gravis is due to bivalent antibodies which, though normally too large to pass through the placenta, are "milked" into the foetal circulation by the uterine contractions during labour and produce thrombosis in the foetus causing jaundice, erythroblastaemia, and kernicterus; whereas univalent antibodies pass into the circulation during pregnancy and produce a progressive anaemia and in severe cases stillbirth or hydrops foetalis, kernicterus not being a common sequel. Moreover, the infant with icterus gravis is normal when born, but develops jaundice and toxaemia shortly afterwards; transfusion is useless, though transfusion with Rh-negative blood of a suitable group is the best treatment for infants showing progressive anaemia and hydrops. The annotation concludes with the words, "These findings are important, and they serve as another example of the need for backing laboratory hypothesis by clinical observations."

We agree with this conclusion and suggest that it should be applied to the statements made by Wiener and Brody, which the writer of the annotation appears to accept. We would therefore ask how the following clinical and pathological observations can be explained on the theory of Wiener and Brody. (1) Icterus gravis cannot be prevented by caesarean section carried out before the commencement of labour. (2) Occasionally an infant with icterus gravis is jaundiced at birth, and the amniotic fluid and vernix caseosa are stained yellow. (3) Erythroblastaemia may occur in the normal newborn baby, is frequently found in haemolytic anaemia of the newborn, and is present to an intense degree in hydrops foetalis—conditions in which according to Wiener and Brody plugging of the marrow vessels does not occur. (4) Prolonged search has never revealed occlusion of blood vessels by agglutination thrombi in kernicterus. (5) Normal cells are found in close proximity to "ghost" cells in the areas affected by kernicterus. (6) The occurrence of kernicterus in babies in whom iso-immunization has been excluded. (7) Haemolytic anaemia of the newborn is not usually present at birth, but develops on the second and third day of life. (8) Kernicterus has never been found in association with haemolytic anaemia of the newborn. (9) Transfusion with Rh-negative blood has in our experience almost halved the mortality rate of haemolytic disease of the newborn.—We are, etc.,

LEONARD G. PARSONS.
Birmingham. H. BAAR.

Poliomyelitis and Lymphocytic Meningitis

SIR,—Dr. J. Egerton Caughey (May 8, p. 903) has drawn attention to apparent discrepancies in two recent papers dealing with acute poliomyelitis for which I was wholly or partly responsible.

1. Regarding the 1941 outbreak of acute poliomyelitis amongst New Zealanders serving in Egypt, I had hoped that my reference to this in a paper read before the Royal Society of Medicine in 1945 might have shown Dr. Caughey that, though I had been unwilling in 1941 to accept his view of this outbreak, further experience of the disease had convinced me that he was right in labelling his cases of lymphocytic meningitis as non-paralytic cases of poliomyelitis.

2. In the second paper he refers to (McAlpine, Kremer, Buxton, and Cowan, *British Medical Journal*, 1947, **2**, 1019) reference was made to the incidence of acute benign lymphocytic meningitis in British troops in Egypt. Three reasons for believing that these were not cases of poliomyelitis were: first, that acute poliomyelitis did not occur in *epidemic* form amongst British troops in Egypt between the years 1941–5; secondly, that the cases of benign lymphocytic meningitis greatly exceeded the sporadic cases of poliomyelitis; thirdly, the degree of pleocytosis in the C.S.F. was greater than in poliomyelitis, counts of over 500 cells being not uncommon.

Therefore, though I feel sure that Dr. Caughey was correct in his interpretation of the 1941 outbreak amongst the New

Zealanders, I believe that another virus was responsible for the majority of the British cases of benign lymphocytic meningitis. As far as we could ascertain at the time this was not the virus of choriomeningitis.

It would be of great interest to us here if Dr. Caughey would give us his impressions of the 1947–8 outbreak of acute poliomyelitis in New Zealand, especially as to the incidence of unusual types of the disease.—I am, etc.,

London, W.1. DOUGLAS MCALPINE.

Juvenile General Paralysis

SIR,—I was very interested in the account of Dr. W. Liddell Milligan's case (May 8, p. 881), but a somewhat similar case which I encountered some years ago leads me to doubt the correctness of his conclusion, namely that a case of juvenile general paralysis had sustained a spontaneous remission.

In 1933 I was consulted by a mother regarding her son, aged 10 years 5 months, who a few months previously had begun to exhibit major epileptic attacks. In childhood, from the age of 1¾ to 3½, he had suffered from "convulsions," but had been quite free from fits of any kind until he had reached his eleventh year. The patient was a well-developed, intelligent boy with no stigmata of any kind. Concomitantly with the reappearance of fits he had changed a good deal temperamentally, becoming irritable and difficult, and often refusing to go to school, etc. Purely as a "shot in the dark" I had his Wassermann reaction examined and found it +3. (The mother's and an only younger sister's were both +2. The father refused to come for examination). I gave the patient no anticonvulsant drugs whatever, and treatment in the main consisted of three courses of bismuth ("bismogenol") separated by roughly six-monthly intervals. From the beginning of the second course no further fits developed. A subsequent W.R. gave a negative reaction. As it was difficult enough to keep up his attendances for injections I did not dare risk examination of C.S.F. About a year ago I heard from this patient regarding another matter and he has kept fit and well.

My suggestion is that Dr. Milligan's case sustained a spontaneous remission from the *symptomatic* fits of congenital syphilis (fits of all kinds, organic or idiopathic, often remit in a mysterious way), but that juvenile general paralysis was a later tragic development which possibly could have been entirely prevented by correct initial treatment. Be that as it may, this interesting case fully justifies one of Dr. Milligan's main contentions—the necessity of an all-round psychiatric training for those who undertake psychological work of any kind.—I am, etc.,

Armagh, N. Ireland. ROBERT THOMPSON.

Acute Intussusception in Childhood

SIR,—The article on acute intussusception in childhood by Drs. Brenda Morrison and Donald Court (April 24, p. 776) should be read by all surgeons and general practitioners, as it stresses the extreme importance of early diagnosis and that once the condition is suspected admission to hospital should never be delayed. My last two cases arrived over 24 hours old; both required a right hemicolectomy on account of gangrene, and fortunately they recovered.

There is one important aetiological factor which I did not see mentioned in the article, and furthermore I am unable to find any reference to it in current textbooks of surgery or in those dealing more particularly with the surgery of childhood—that is that in every case upon which I have operated there has been present an extremely mobile caecum and ascending colon, which together with the terminal ileum were on a long mesentery. Normally, the terminal 1–2 in. (2.5–5 cm.) of ileum, the caecum, and ascending colon lose their mesentery during embryonic life and become fixed to the posterior abdominal wall, but in some 15–25% of individuals the old embryological mesentery remains, leaving an extremely mobile gut. The condition, which is slightly more common in females, predisposes to distortion, displacement, or rotation of the caecum and attacks of pain in the right iliac fossa, culminating in some cases in a volvulus (*v.* Gardiner, R. H., *British Medical Journal*, 1947, 1, 83).

That intussusception is largely confined to healthy first-born male children has not been my experience, as several of my cases have been female infants. The change of feeding to a more solid form of diet at the weaning age of 6 to 9 months produces more powerful peristalsis, which fact, coupled with a mobile caecum, is in my opinion enough to initiate the intussusception. It is difficult to see how a fixed bowel can easily intussuscept.

At operation I agree that reduction should take place inside the abdominal cavity as far as possible, but it is the last "bit" which is always the most difficult to reduce. It is, however, easily delivered outside the abdomen, owing to its mobility, through a para-umbilical incision, without the trauma and shock associated with evisceration. This renders the final steps of the reduction much easier. Furthermore, if unfortunately resection and right hemicolectomy are necessary, due to gangrene, the presence of a mesentery to this part of the bowel makes mobilization an easy matter. The use of pressure enemata is an extremely dangerous procedure for two reasons: first I have known one case end fatally during the administration of the enema, and, secondly, it is impossible to tell if the intussusception has been completely reduced.

Timely diagnosis followed by careful preparation and skilled surgery are the only sure and safe measures to be employed for this serious emergency of childhood.—I am, etc.,

Aylesbury, Bucks. RALPH H. GARDINER.

Antihistamine Drugs

SIR,—Your leader on histamine (May 8, p. 887) comments on Southwell's negative results with "anthisan" published in the same number. You seem to be much impressed by the use of inactive control tablets, and you appear to think that this in itself guarantees a true result. But this, I submit, is not the case. The control experiment can have this result only if the drug which is tested has been given in an effective amount. For instance, if, say, 1 minim of adrenaline were given to asthmatic patients, and 1 minim of physiological saline as a control, I am sure one would obtain results similar to Southwell's: some of the patients would improve remarkably with saline, whilst some of the others would get worse. Before beginning such an experiment with dummy controls one must try to find the optimal dose of the drug in question, and this can be done only individually. Unfortunately Southwell has made no such attempt, but has given the same dosage to all patients. This dosage was rather small (0.1–0.3 g.), and in addition was given over long periods in three or even four daily doses. I have found that this may cause tolerance and therefore give false results. The fact that drowsiness has been noted in only 10 out of his 42 patients makes it very probable that the dosage was insufficient. In my cases (*Lancet*, May 1, p. 677), the optimal dosage was nearly always accompanied by drowsiness.

Another serious source of error is the assessment of results according to the patients' reports. Everybody who has tried to define with chronically asthmatic patients what they regard as "an attack" knows that their conception varies enormously. In most cases they are not sure where the chronic wheeze ends and the "attack" begins. If the condition is to be assessed over a long period the violent fluctuations which occur and which may not be influenced by any drug may render any assessment still more hazardous. There *must* be an additional objective measurement. The vital capacity is the only such measurement I know of, and it has proved to various authors and to myself a reliable standard. For instance, Curry (*J. clin. Invest.*, 1946, 23, 785) has shown that by varying doses of histamine different degrees of bronchial spasm and exactly proportionate decreases of vital capacity could be induced.

It is quite evident from my own experiments (which probably were not known to you when your leader was written) that anthisan does not benefit *all* asthma patients. Not all of them tolerate sufficiently large doses, and in a severe attack no dose seems to be large enough. But in a moderate degree of bronchial spasm it is often effective. If a really objective method is used, for instance intravenous injection, whilst the respiration of the patients is recorded by the spirometer and by the thoracograph of Verzár, the results can be relied upon. I have recently given doses of 0.05 to 0.1 g. in 10 experiments with 7 cases of asthma who were in a moderate asthmatic state. In 7 of the 10 experiments a striking increase (between 380 and 2,000 ml.) of the vital capacity occurred within 5 to 15 minutes. These increases could not be obtained by injections of physiological saline or glucose.

The mode of action of the antihistamine drugs, many more of which will appear in the near future, is full of problems. Their dosage varies more than that of other drugs, and the way

in which tolerance is acquired is obscure. With some of them it is difficult to find two patients who react to the same dose in exactly the same way; this holds not only for the antihistamine drugs proper but also, to a certain extent, for other substances with partly antihistamine action, like ephedrine and adrenaline. To mention only two of the many unexplained facts—why does anthisan, when given intravenously, require as long as 5 to 15 minutes until it acts? And how are we to explain that if ephedrine, "benadryl," or anthisan are given in one dose daily some of the side symptoms disappear after one or two days while other effects stay almost indefinitely?

Obviously these are very complex problems, and the question of the efficacy of these drugs cannot be solved by the use of dummy tablets and the reports of the patients. For this reason I feel that the conclusions in your leading article are premature.—I am, etc.,

London, W.C.1. H. HERXHEIMER.

Penicillin Treatment of Scarlet Fever

SIR,—An outbreak of this disease in a large institution afforded an opportunity on a small scale of trying the method of treatment advocated by Dr. Torben Jersild, of the University of Copenhagen (Feb. 14, p. 318). Before seeing this report, 11 of the 79 cases had been treated with sulphanilamide with unsatisfactory results, inasmuch as three had unfavourable features. One had double antrum inflammation, another cervical adenitis, and the third went home after four weeks still harbouring the haemolytic streptococcus A in nose and throat and continuing to show positive swabs until nearly eight weeks from the commencement of the illness. Penicillin intramuscularly, as a snuff, and as pastilles caused a rapid disappearance of all symptoms and of the haemolytic streptococcus in the other two cases.

The remaining 68 had penicillin as recommended by Dr. Torben Jersild—100,000–150,000 units intramuscularly, twice a day, for six days. Not a single complication of any kind occurred, except in one case a penicillin rash was seen on the third day and treatment was stopped. It also had no effect in preventing recurrence of scarlet fever, for two cases had the typical rash and slight sore throat 3–4 weeks after the first attack. Penicillin treatment for three days resulted in negative swabs on the eighth day. Sixty-two gave negative nose and throat swabs when tested on or about the eighth day after the rash. Positive swabs were obtained in the six other cases; five became negative after about 14 days with further penicillin treatment for three days. One failed to respond until 24 days later, when very few haemolytic streptococci were found. A prolonged and intractable acute tonsillitis a few months previously may have been responsible for this poor result.

Most of these might safely have returned to the institution after eight days; but as it was winter a period of two weeks' isolation was adopted, and a further week for convalescence. The advantage of a shortening of the time lost through illness appears to be counterbalanced only by the objection that patients so treated may show penicillin sensitization at some future date. Rapid relief of sore throat was noticeable in all cases, and the general health excellent.

I am greatly indebted to Dr. D. D. Payne, the Medical Officer of Health, and Dr. J. Colbeck, County Pathologist, for their kind and helpful co-operation.—I am, etc.,

Harrogate. R. F. CAMPBELL WARD.

Diagnosis of Periarteritis Nodosa

SIR,—The two cases of periarteritis nodosa described by Dr. J. M. Sutherland (May 1, p. 832) again bring out the difficulties of diagnosis. As Dr. Sutherland states in the section on diagnosis, "The possibility of periarteritis nodosa should be borne in mind in a case presenting multiple symptoms referable to several systems." Having arrived at this stage in the differential diagnosis, the problem arises as to how to clinch the diagnosis. The means of doing so fall into two groups, (*a*) histological section of a node or piece of muscle, and (*b*) visual evidence.

As regards the latter, Dr. Sutherland mentions only the ophthalmoscope, but there is another way, and that is visualization of the lesions through the peritoneoscope. Involvement of the mesenteric vessels is common in this condition, and it is easy to visualize the nodes on these vessels through a peritoneoscope. The procedure can be carried out under local anaesthesia with a minimum of disturbance to the patient. Dr. Sutherland's first patient had abdominal pain, and the necropsy in Case 2 revealed involvement of the vessels of the small intestine. It is almost certain that Case 1 would have shown mesenteric involvement. I have described the visualization of the condition by peritoneoscopy in an article in the *Medical Press* (1947, 118, 487).—I am, etc.,

Leicester. A. P. M. PAGE.

The Problem of Caries

SIR,—I have recently had the opportunity to read the annotation (April 10, p. 697) on "The Problem of Caries." Since you call attention to the researches of Pincus and Frisbie, which supposedly support the concept that the destruction of the enamel organic matrix is the initial caries lesion, it seems opportune to point out some of the recent evidence supporting the more widely held view that surface enamel acid production is directly related to the caries process.

In our laboratories we have made the observation that following the ingestion of refined carbohydrates the glucose (reducing substance) content of the saliva may show an immediate elevation to values in excess of 1,000 mg.%. This magnitude, depending upon the eating habits, characteristics of the food, etc., may persist in certain instances for periods as great as one hour. Stephan has demonstrated by *in vivo* methods that within two minutes after sugar solutions are ingested by caries-susceptible persons the *p*H of the tooth surface or within the carious cavity falls from approximately 7.0 to below 5.0. Such phenomena do not occur in caries-immune subjects.

The significance of *p*H values approximating 4.5 is not clearly understood. A variety of possibilities present themselves. They include: (1) This *p*H is critical for enamel decalcification. (2) This *p*H approaches the optimum for the activity of the acid phosphatase, an enzyme which has been demonstrated to be present in salivary bacteria by at least three investigators. (3) This *p*H approaches the optimum for many proteolytic enzyme systems, possibly for those present in organisms capable of producing caries. (4) This *p*H approximates the iso-electric point of the enamel protein, and the physical properties of this tissue may undergo marked alterations of importance in caries production. Any or all of these may be related to caries aetiology, but each depends on refined carbohydrate intake and bacterial acid production.

One fact seems indisputable—the diet must contain refined carbohydrates of the nature of starch, sucrose, or glucose if we are to produce experimental caries in animals. The Syrian hamster has been studied extensively by American investigators since 1942. I am aware of no single instance in which experimental caries has been reported as being produced with diets devoid of these materials. Fortification of these experimental diets with so-called protective factors has been a most ineffective caries-control measure.

It also seems pertinent to mention that the most extensive caries-control measure being used in the United States to-day is the topical application of fluorides. These have been shown repeatedly by controlled clinical studies on human being and animals to reduce dental caries by slightly in excess of 40%. Laboratory researches indicate that the application of topical fluoride results in a union of fluoride with the mineral phase of the enamel, reducing its solubility by approximately 50% and enhancing its surface hardness. It seems more than coincidental that a substance affecting acid solubility should limit dental caries.

One cannot resist the temptation of suggesting that the most unsatisfactory aspect to research in the field of dental caries has been the constant unscientific criticism of our endeavours by many medical colleagues. In general, these gentlemen refuse to accept the view that the aetiology of tooth decay may not be comparable to that of other diseases. Such an attitude is discouraging, but understandable when one remembers the reluctance with which such fundamental disease concepts as bacterial infection, virus infection, and vitamin deficiencies were adopted.—I am, etc.,

Tufts College Dental School, Boston, Mass. J. F. VOLKER.

The Process of Ageing

SIR,—No doubt treatment of ovariectomized rats by various sex hormones and thyroid, as described by Dr. V. Korenchevsky (April 17, p. 728), represents valuable research work on relations and interactions of different endocrine glands and on their consequences to the metabolism of other organs, but it must be emphasized that ovariectomy itself does not produce the same effects as the physiological process of growing old in spite of certain features in common—for instance, in both cases

basophilic cells of the anterior lobe are increased and gonadotrophic hormone secretion is augmented. Loss of weight of organs can be caused by other endocrine glands or by changed influence of the hypothalamic, supraoptic, and paraventricular nuclei, and is not a symptom just of old age.

A certain difference of the body's reaction to castration and to growing old should be expected, because at the former fully functioning ovaries are suddenly removed from the system, but in the latter ovarian activity slowly has ceased, together with the loss of the ova. Further, a woman ovariectomized at the age of about 35 may live fifty more years, but a woman of 70 certainly not. Characteristics of old women, such as senile skin changes, loss of hair pigment, and growth of beard, do not commonly occur after ovariectomy, especially not involution of the whole of the body (osteoporosis, etc.), nor the pronounced emaciation often seen in senile women.

After the menopause gradual shrinkage of the adrenal cortex occurs, its function becomes weaker, and the 17-ketosteroids excretion decreases. As a result of castration, however, hypertrophy of the cortex, at least in some species, is observed. Especially in the male and in older female animals the hypertrophic phase may continue. Unlike what happens in old age, hypertrophy of the thymus occurs after castration in adult rats. Among eunuchs in Oriental countries there have been men of high intelligence who led long and active lives. Variations in fat metabolism and muscular weakness are due to individual differences in the influence of the hypothalamic centres. On the other hand, spermatogenesis is not unknown in old men of 80 or more, in spite of obvious signs of senility.

All experimental operations such as hypophysectomy, thyroidectomy, adrenalectomy, or gonadectomy have far-reaching consequences on the entire endocrine system, on the diencephalon, and on general metabolism. But the changes brought about are very different from the physiological process of ageing, which depends on two factors. (1) The life cycle and lifetime of cells of different tissues are different, and determined according to specific physiological needs. Relatively, the adrenal cortex begins to diminish in size in late embryonic life, but its extreme involution is significant of senescence. Involution of the thymus, of the pineal gland, of the gonads, and finally of the anterior lobe takes place during particular stages of life. The latest "natural" involution seems to be that of the vital nerve centres in the medulla oblongata. With this sequence the process of ageing is a very gradual one. (2) The whole endocrine system, which is of decisive importance in the ageing process, itself depends on the nervous and chemical function of the diencephalon. Because of this physiological relation all hormone therapy of ageing remains restricted within certain limits. As yet we do not know how to control and influence diencephalic activities either by chemical or physical means.—I am, etc.,

London, N.W.3. HANS BAB.

Medical Photography

SIR,—Having spent much more time and money than I could afford on clinical photography, but without any regrets, I would nevertheless endorse the views of Drs. ffrangcon Roberts (March 13, p. 485) and James F. Brailsford (May 1, p. 855). The hospital photographic department is an absurdity based on a misunderstanding of the function of art in medicine; or would anybody propose the employment of a biographer to take case histories?

For the clinician must take his own photographs if they are to be of any value to himself or of any use to his students; and the hospital need only provide a studio, some non-mobile equipment, and the part-time services of a technician for processing. Every university, however, should have a department for medical photography in order to provide instruction and advice on technique and to facilitate research.

The reason for the present exorbitant demand for ancillary services should be clear enough. The prudent householder uses all the electricity he possibly can in case his present consumption becomes the basis of rationing—and will not our new masters echo the cry of those who put them in power, "Never had it before, Doctor"?—I am, etc.,

Manchester. J. H. TWISTON DAVIES.

SIR,—Dr. J. F. Brailsford (May 1, p. 855) is of course entitled to his opinion that there has been no improvement in medical photography during the past forty years, but it would be strange if this branch had stood still while all others have progressed. I cannot help but suspect a *laudator temporis acti*.

To mention names would perhaps be invidious, but it would be nearer the truth to say that while there do exist many excellent illustrations in the literature, the great bulk of pictorial work is mediocre. Blaming the editorial boards will not help if the material is not good in the first place.

The scorn which Dr. Brailsford pours on the figures quoted in his last paragraph would have borne more weight had he told us whence they emanated. There are two main reasons why output has risen, apart from the demand for teaching. First, the supply of material is improving; this held down availability in preceding years. Secondly, more uses are being found; in the control of the growth of visible tumours, for example, a controlled scale print is much less liable to error than the more usual outline sketch, and in a properly organized department is not only more accurate but actually time-saving. The photograph is free from any possibility of personal error, which may well change with the observer.

An Exhibition of Medical Photography sponsored by the Medical Group of the Royal Photographic Society is to open at the Royal Society of Medicine on May 24. May I suggest to Dr. Brailsford that he permits the committee to exhibit some of his forty-year-old illustrations? Even allowing for any deterioration of the prints due to age it should be most instructive to compare them with present-day work.—I am, etc.,

Manchester, 13. ROBERT G. W. OLLERENSHAW.

Treatment of Pruritus Ani

SIR,—Dr. Alexander Orley, in his letter on the treatment of pruritus ani (May 8, p. 904), tends to indicate that in Guernsey the aetiological factors of this troublesome condition differ greatly from those which obtain in most other parts of the world. He states, "The variety of methods of treatment and the frequent therapeutic failures in pruritus ani are probably due to a lack of recognition of the fundamental cause of the complaint." This is exceedingly true, but surprisingly enough he then proceeds to remark, "This cause, however, is always the same. It is the exposure of the perianal skin to particles of faecal matter." In his series of about 50 cases he does not seem to have encountered some of the most common causes of pruritus ani, such as asthma, eczema, yeast and tinea infections, nor any of the others not infrequently discovered, such as threadworms, amoebiasis, lichen planus, gonococcal proctitis, etc.

He remarks that it usually occurs in middle and old age, more seldom in young individuals, and practically never in the young and adolescent. Of 107 cases seen by me in 1946, 19 patients were aged between 21 and 30; 32 between 31 and 40; 13 between 41 and 50; and 21 between 51 and 60 years of age.[1]

Undoubtedly *x*-ray therapy is, as he says, extremely useful, but it has the great disadvantage that the patient obtains so much relief from it that should a relapse occur he is apt to importune the doctor for further treatment, and only those who have seen a number of pruritus ani patients with a complicating radiodermatitis can know what this combination means.

Finally, he remarks that a combination of *x*-rays and anal hygiene has been uniformly successful in over 50 cases, but it is to be regretted that he does not state what period of time he has chosen as the criterion for a cure.—I am, etc.,

Edinburgh. G. A. GRANT PETERKIN.

REFERENCE

[1] *Edinb. med. J.*, 1947, **54**, 584.

Unusual Inguinal Hernia

SIR,—In March, 1948, an African male aged about 35 years was admitted to Cape Coast Hospital. He stated that he had had a swelling in the left groin for four years. It was difficult to make out from his history whether the swelling had been self-reducing or not. Three hours before admission the swelling had increased in size, become painful, and he had vomited twice.

On examination there was a tender, tense, irreducible swelling about the size of a tangerine in the left groin, with slight protrusion through the external inguinal ring. There was no cough impulse. The condition was diagnosed as strangulated left indirect inguinal hernia.

Under hypobaric "percaine" spinal anaesthesia the diagnosis was confirmed. The hernial sac contained a loop of very congested but viable small intestine. The strangulation at the internal ring was

relieved. All attempts to reduce the gut to within the abdominal cavity failed, though a finger could easily be passed through the internal ring. A sudden subserous haemorrhage into the gut wall, stripping up the serous coat for several inches, made resection of about ten inches of gut with end-to-end anastomosis necessary. It was easy to draw down additional gut to perform the resection wide of the injured area.

Again attempts to reduce the remainder of the loop of gut failed. Laparotomy through a low left-paramedian incision revealed the reason for this inability to reduce the intestine to within the peritoneal cavity. About three inches above and internal to the internal inguinal ring there was a narrow-mouthed pouch formed by the posterior parietal peritoneum, through which the intestine passed. This pouch expanded downwards and outwards into a wide serous-lined cavity, which narrowed as it passed through the internal inguinal ring and was prolonged into the inguinal canal as the hernial sac. The abdominal mouth of this long serous-lined cavity was narrow, and, though firmly holding the loop of small intestine, was not causing strangulation. By pulling gently from above and pushing from below the gut was easily returned inside the peritoneal cavity. The abdominal opening of the sac was ligatured and the abdominal and hernial wounds closed. The patient's condition caused some anxiety for the next twenty-four hours, but subsequently recovery was rapid.

I am indebted to the Director of Medical Services for permission to publish this case.

—I am, etc.,

Cape Coast, Gold Coast. A. F. FOWLER.

Waiting for Tonsillectomy

SIR,—It is certain that the waiting-lists for admission into hospitals of children needing tonsillectomy and adenoidectomy have now reached such proportions that a desperate position has arisen. As many of us know from personal contact with the parents and reading their letters, their anxiety anent the health of these youngsters is leading to acute distress; whilst to doctors whom they have consulted and who have advised the operation—often marking their notes, "Needs very early operation"—this state of things has become intolerable.

Both parents and medical advisers see the steady deterioration in these children, and just at a time of life when it is of the utmost importance that healthy growth should be encouraged and not hindered, with all the serious complications that may reasonably be feared.

I cannot see that this problem is insoluble, nor that its urgency is not obvious, and I sincerely hope that this letter will stimulate response and lead to action without delay.—I am, etc.,

London, W.1. WILLIAM IBBOTSON.

Advantages of Impure Penicillin

SIR,—In relation to the annotation entitled "The Advantages of Impure Penicillin" (April 24, p. 795), in which it is stated that it has been suspected for some time that the imperfectly purified penicillin of earlier days was more effective than the refined present-day product, and that recent experiments show conclusively that in the purification of penicillin something unknown and valuable is lost, I would mention that this conclusion was arrived at by co-workers and myself in this hospital in early 1944.

In this pioneer work aseptic pyrogen-free penicillin filtrate injected intramuscularly in human beings was followed by recoveries and clinical effects in fulminating diseases such as subacute bacterial endocarditis and meningitis which could not possibly be accounted for by the penicillin content of the filtrate, thus suggesting some potent unknown factors, probably both antitoxic and antibacterial, and immeasurable by known methods. I am not, of course, advocating a return to the filtrate, but it would appear that a wide field for further research lies open in that direction.

Unfortunately our results were not published, presumably—and possibly quite rightly—on the grounds that the idea appeared in those early days too far-fetched to be put forward as a scientific theory.—I am, etc.,

Wellhouse Hospital, Barnet, Herts. H. R. SEGAR.

SIR,—With reference to the annotation entitled "The Advantages of Impure Penicillin" (April 24, p. 795), I beg to point out that I arrived already in 1944 at the conclusion that "in the purification of penicillin something unknown and valuable is lost." Together with W. K. S. Wallersteiner I wrote, "The effects of this suspension, in addition to the penicillin effect, are due to the presence or production of other potent bacteriostatic compounds—which are destroyed or left behind in the manufacture of penicillin" (*Nature*, 1944, **153**, 380). The suspension referred to was the product "vivicillin." Preliminary animal tests with this product had been carried out by E. v. Lustig-Lendva (*Vet. Rec.*, 1944, **56**, 178), whilst Dr. R. Segar, Medical Superintendent at the Wellhouse Hospital, Barnet, was the first one to submit the product to clinical tests on a large scale at his hospital.—I am, etc.,

London, N.W.4. H. ENOCH.

Viennese Twilight

SIR,—I have received from my publisher, Heinemann and Co., London, your review (Jan. 17, p. 103) of my book, *The Art of Healing*, and I feel that this criticism should not go unanswered, as it misrepresents the whole tendency and contents of my book and misinforms the British medical profession as well as the general reader. At a time when the British medical profession is in such a predicament that a large part of the nation is disappointed enough with its accomplishments to want to make the physicians servants of the State, the medical profession should consider whether it is not itself responsible to a large extent for this shameful situation.

Those among British physicians who are not "isolationists," as the reviewer of this book, may know that in Germany and in France medical thinkers, including this author, have spoken during the last decades of a very serious "crisis in medicine," which was brought on by overemphasis of "hyperexact" detail work, over-specialization and laboratory medicine, and by neglect of the practical, erroneously called "empirical," methods of pre-Virchowian medicine, thus making the practice of medicine too fussy, complicated, and expensive. In England itself it was mainly outside of the medical profession that this harmful development was recognized. Bernard Shaw's *Doctor's Dilemma*, despite its satirical exaggerations concerning the overemphasis of the so-called "scientific," bacteriological, and surgical trend, is still valid to-day. A. Flexner, the emissary of the Rockefeller Foundation in America, has sufficiently exposed in his famous reports on "Medical Education" and "Universities" the superficiality of the present British trend.

There are in fact two principal approaches to theoretical and practical medicine. One—and this is the prevailing doctrine in England and some other countries—denies the value of the methods of our medical predecessors and looks for salvation in present and future new discoveries only, stressing at the same time the allegedly "exact" (auxiliary) natural sciences such as physics, chemistry, anatomy, experimental physiology, bacteriology, etc., while discarding all the methods (of medicine proper) of proven practical value which have been collected by earlier successful physicians from antiquity up until 100 years ago.

The second trend believes that, even more than any other science and art, medicine (which is not an exact science but collected experience) must be founded on the best of the practical therapeutic methods of the past. All the pious talk about Hippocratic ideals and Hippocratism becomes pure lip service and nonsense if we sneer at such fundamental and indispensable methods of general care as the deplethoric, antiphlogistic, antidyscrasic, tonic, antispasmodic, and other methods, which include properly indicated purging, sweating, bleeding, venesection, cupping, leeches, vomiting, and the utterly neglected counter-irritation.

The Constitutional Doctrine is itself divided into these two principal approaches to medicine. Julius Bauer, the author of *Constitution and Disease*, whose fatalistic philosophy is praised so highly by the reviewer of my book, is a follower of the former hyper-rationalistic, dogmatic, and hyperexact trend of dialectic materialism, which has led medicine to scepticism, therapeutic nihilism, and unnecessary incompetence in many fields. According to Bauer, constitution must be identified with heredity and therefore cannot be influenced by therapy.

On the other hand Hippocrates and all his followers, including Sydenham, Hunter, Heberden, Hufeland, and in modern times Friedrich Kraus (Berlin) and F. Martius (the original founder of modern constitutional doctrine), do believe in the possibility of influencing human constitution by therapy. I myself tried to put this endeavour into practice by combining the discarded but valuable fundamental methods of the past with modern medical standards. Scientific evidence in my *Textbook of Constitutional Therapy* (Hippocrates Verlag, Stuttgart, 7th edition, 1934). As this attempt was new, at least in our time, I tried to bring it into a teachable system and called it constitutional-therapy, an accomplishment which was given credit by the noted medical historian Dr. H. E. Sigerist,

Johns Hopkins, Baltimore, in a review of the American edition of the same book ridiculed by your reviewer. I am enclosing a copy of Sigerist's review. As Sigerist suggested that I should prove my claims in a more specialized field I published in 1946 a monograph *Treatment of Arthritis and Rheumatism in General Practice*, New York, 1946, which was warmly accepted by a large part of the American medical press (reviews enclosed). For more than 20 years I have been able to demonstrate in my clinical and private practice that the large majority of all cases of arthritis (which is osteoarthritis) can be greatly improved or completely cured in a relatively short time by these very methods of historical tradition, particularly the various forms of alteration, elimination, and counter-irritation. As is known, the treatment of arthritis is a stumbling block of modern medicine which cannot be overcome by the present allegedly "exact" and "rationalistic" medical methods.

The same applies to the treatment of stomach ulcer, gall-bladder, and kidney diseases, skin conditions, menstrual disorders, conditions of the menopause, etc. The reviewer pokes fun at emetics as the means of treating schizophrenia. If he would have read the classics of the 17th, 18th, and early 19th centuries (not to speak of Hippocrates, Galen, and his followers until modern times) he would have found out that vomiting is one of the oldest, simplest, and most effective forms of shock-treatment. I have published a whole monograph on this subject in 1933, and I can prove daily the truth of this statement. Incidentally a member of a noted family in London who had been suffering from schizophrenia for many years and could not find any relief by the usual routine treatment was so greatly improved within three months last year by emetics, drastic laxatives, and hydrotherapy that he lost his spells of catatonia and maniac outbreaks and became self-controlled and sociable.

The reviewer also ironically derides the vital importance of a regular menstrual flow for feminine health. The frequently devastating and unpredictable consequences of premature artificial menopause (brought on by indiscriminate hysterectomy or radiocastration), known to any unprejudiced observer, sufficiently refute the reviewer's remarks.

The reviewer of my book also does not believe in the diagnostic and therapeutic significance of the coloration of hair, eyes, and skin. In this respect earlier physicians and modern homoeopathic physicians have much more broad-minded views. That the confidence of the public in the present form of scientific medicine actually is shattered to a large extent cannot be doubted by anyone who opens his eyes. The numerous sectarian and "eccentric" trends are only an inadequate reaction to this situation. The true scientific remedy is, as mentioned above, the combination of the erroneously discarded practical methods of the past with modern diagnosis and technique. If the reviewer does not want "to return . . . to the mediaeval mess of leeches, purges, emetics, and clysters" (to which venesection and other methods mentioned above must be added), he deprives practical medicine of nine-tenths of all effective, sometimes even life-saving, therapy which is still principally "empirical" and will be so for a long time to come, if not for ever.

These are not mere theoretical speculations but facts proved by the author and his followers in various countries for more than 20 years by the cure of just those patients which laboratory medicine has failed to heal.—I am, etc.,

New York. B. ASCHNER.

Health Centres

SIR,—Now that the graver differences between the profession and the Minister have been resolved and the Act will in due course come into force, it may perhaps be appropriate to raise again the question of the health centre as the base of operations for the family practice of the future. The concept and purposes of the health centres have been widely accepted and approved, and one of the greatest disappointments, alike to the supporters and disputants of other main provisions of the Act, was the recent intimation from the Minister that there was no hope of early action in respect of them. Perhaps, however, we need not despair unduly and pressure may be brought to bear upon the Minister to consider at least certain important priorities.

There are, for instance, some cities, which have given particular attention to matters of health centre design and staffing, in which earlier action and the building of the first experimental centres might, for good reasons, be sanctioned. But there is one case which calls for special consideration—namely, that of the health centres to be established in close geographical proximity to, and close spiritual relationship with, the teaching hospitals. Well planned and adequately staffed with practitioner teams of appropriate experience and age constitution and the necessary ancillaries, and given responsibility for the antenatal and maternity and child welfare work of their locality, these centres could and should become an integral part not only of the public service but also of our evolving patterns of educational establishment having as their main concern the training of medical students and the advancement of knowledge. The staffs of such centres, given proper regard for age, training, and competence, should hold status comparable with that of the teaching-hospital staffs.

With reciprocal interest as between such centres, the clinical departments of the hospital, and university departments of social medicine (where such are in being), (*a*) the training of the young doctor, and (*b*) socio-medical inquiry in the domestic sphere could both be greatly assisted. Some of us would eventually like to see apprenticeships in approved health centres becoming statutory during the first post-qualification year and accepted as having an importance not less than that of house appointments. Here for the first time the young graduate would obtain his experience of the patient in relation to his family, his living conditions, and his work; of the varied methods and problems of family practice; and of a personal health service (especially for mother and child and adolescent) as distinct from a purely sickness service. Here, too, better recording systems, more intimate collaborations between the practitioner, the hospital, and the officers of the public health authority, and new economies of time and labour in family practice could be given their first trial. And finally, with the advantages accruing from improved relationships and new responsibilities, these health centres could come to set the standards which would ultimately be expected of other centres more remotely situated. The practice of social medicine at the family level would, in fact, have a chance to start off "on the right foot."

The first essential for an improved practitioner service, and one which has never received enough official emphasis, is a very great improvement in the conditions under which the doctor works, in his equipment, and in his sense of association with other branches of professional activity.

Will the Minister reconsider his late pronouncement in favour of urging the early design and building of health centres to work in suitable areas not too distant from each of the medical schools of the country and in intimate association with them?—I am, etc.,

Oxford. JOHN A. RYLE.

Full-salaried Service

SIR,—The B.M.A. is to be condemned for permitting the profession to fall between two stools. We are thus faced now with the bad points of both systems. The senseless overwork of the competitive system remains, but we fail to gain the benefits of the nationalized service—adequately staffed health centres and fixed hours of duty—which would put an end to the endless drudgery of general practice.

Furthermore, we now find that the B.M.A. is not able legally to act as a trade union, and in a nationalized service the need for such a protective body is glaringly necessary, and the sooner the better.

It is easy to be wise after the event, but it is obvious either that the B.M.A. should from the start have resisted all attempts at nationalizing the profession, or, having admitted the desirability of such a scheme (which it did admit), it should have sponsored a completely socialized whole-time salaried service with the abolition of private practice. For this is the only method of providing the public with *adequate* medical attention at all times and, at the same time, providing the doctors with fixed hours of duty. (It would of course also remove the antisocial vested interest in ill-health, as Bernard Shaw has pointed out.)

We general practitioners are aghast at the prospect of the added work ahead of us for ourselves and our households, necessary maybe from the insurance point of view, but not necessary from the health aspect. Because of division within our ranks, our own undecided leadership, and by financial blackmail, Mr. Bevan has continued to "swing" it on us, without even the provision of health centres, the *sine qua non* of the general practitioner's compliance. The only result possible is an unsatisfied public, because there will be even less time than at present to give to the real sick, and a grossly dissatisfied profession because of added unnecessary work. Already we know only too well how we are forced to wear ourselves out not by attending the sick but rather by all the extraneous matters which force the populace to flock to our doors.

To those general practitioners who do not like the word "salary" it will be necessary to point out that in a socialized service the country would be divided into districts serviced by the requisite number of doctors, and the capitation fees would be pooled and divided. The older doctors may feel that as they grow older they should be entitled to more money, but in actual fact, because of their age, their need is less work rather than more money, especially as in a pensionable scheme the need for the latter is provided for. It is indeed the younger men who are in need of larger incomes—with families to feed, clothe, house, and educate, whereas the families of the old doctors would presumably be grown up and self-supporting, and there would no longer be the need to be over-housed with the advent of the health centre.

Now that a socialized service is upon us our needs are for *less* cant, hypocrisy, and sentimentality (such as goodwill, doctor–patient relationship, etc.); *more* understanding of present-day realities; and the formation of a strong trade union with strong leaders who will not throw up their hands in horror at mention of a "paper" strike. The "paper" strike will in fact be the only weapon of defence against any Government both on our own behalf and the behalf of our patients—should negotiations fail.

When the profession realizes—as it will in time—that the majority of patients will be "panel" patients I venture to think that it will see not only the advantages but also the necessity of a completely socialized service with its health centres and fixed hours of duty. These are two of the primary points which the general practitioner should be fighting for now—and the specialists too if they are not given them.

Now that we are committed to this scheme we might as well begin by fighting for the good of both worlds—our own as well as that of our patients. (It might be as well too to point out to them the fact, which few patients seem to appreciate, that we doctors do have our own worlds apart from them.) Just as few patients show more than passing concern of the fact that we may be working night as well as day, so we need expect no Government to be interested in our conditions of service unless we fight for them ourselves through our own trade union and the Housewives' League.

May our leaders, at this eleventh hour, be granted an understanding of present-day doctoring. Changing conditions need changed methods. Much good will be lost from the old, we know, but in compensation we have also lost much harm.—I am, etc.,

Englefield Green, Surrey. W. E. R. BRANCH.

Terms of Service

SIR,—There is a general impression that the financial terms offered by the Government under the new national health scheme are fair and even generous. This has been stated over and over again by the Press, by Government supporters in Parliament, and even by the leaders of the Opposition. When the public reads that a doctor with 4,000 health service patients will receive £3,332 per annum, it does sound that doctors would be generously paid, and even many general practitioners are under that impression. Actually the reverse is the case and the payment offered is miserably inadequate.

There are about 20,500 general practitioners in the country, and the population for which they may provide medical treatment is about 47,750,000. Excluding the considerable number who will not avail themselves of the new Health Service, including Christian Scientists and followers of one or other of the numerous unorthodox medical cults, the numbers left to the orthodox medical practitioner cannot be many more than 2,000 a head. Many practitioners will have less, and very few can reach the maximum of 4,000, with a gross income of £3,332. Two thousand patients is probably the average a doctor has at the present time, and if he has a fair proportion of infants, young children, and old and chronic cases this is at least as many as he can look after properly without being overworked, unless he lives in one of the densely populated districts where all his patients live within half a mile of his residence and can be rapidly and speedily visited on foot.

With 2,000 patients a doctor's gross income under the new Health Service will be £1,816, but out of this gross income he will have to provide at his own expense a sufficiently large house with a surgery and waiting-room. He will have to pay a secretary and provide for the cleaning and heating, furnishing, and decorating the premises. He will have telephone and postal expenses, and to provide and maintain for his professional use at least two cars in a rural or semi-rural district, so that one is always available. He will have to provide and maintain his instruments and medical library. If he goes on holiday he will have to pay a locumtenent about £15 15s. a week, and to supply him also with board and lodging and motor-car expenses.

If he is ill he also will have to arrange for a locumtenent. He will still have to be available to all his patients 24 hours a day and 365 days a year, or provide and pay a deputy. He will have to provide attendants for the door and telephone day and night. As his maids and secretary cannot be expected to be on duty for 24 hours a day, it follows that a doctor's wife takes their place when they are out, so that usually a doctor's wife has just as long hours of duty as her husband. Many doctors now are unable to obtain any domestic assistance. Before the war it was calculated that a third to a half of the gross income was spent in practice expenses. These expenses have all increased. This is especially the case with domestic wages, which have more than trebled.

Mr. Aneurin Bevan is offering less remuneration than that recommended by the Spens Committee. This is not generally realized. I hope our representatives are emphasizing this aspect of the new Health Service in their present negotiations.—I am, etc.,

Rainham, Kent. DESMOND LONGFORD.

SIR,—At the Panel Conference last October, at which I was present, Dr. Dain stated in reply to questions: (1) That the Negotiating Committee had not discussed Regulations because they had not yet decided whether the profession was going to work the Health Service: (2) that they had not discussed compensation, as they had not accepted the principle of the abolition of the sale and purchase of practices.

At the time and ever since I thought it would have been better if the Negotiating Committee, instead of taking a stand on a platform of four ideological planks, three of which were rotten and have now been thrown aside, had got down to brass tacks. With a view to getting some of these tacks hammered out I have sent notice of four resolutions to my local branch of the B.M.A. which I hope will go up to the Representative Meeting:

(1) That any practitioner who has been practising midwifery prior to the appointed day shall be automically entitled to take part in the midwifery service under the Act without applying to the Local Obstetric Committee, and that the Minister be pressed to alter the Regulations accordingly.

(2) That there shall be no alteration in the terms of service without negotiation with the accredited representatives of the professional bodies concerned, and that the Minister be pressed to include this in the Amending Act.

(3) That where a practitioner takes another practitioner into partnership he shall be entitled to receive forthwith the compensation for that portion of his practice transferred to the incoming partner.

(4) That where a practitioner leaves a practice to take up another practice elsewhere he shall be entitled to compensation for the practice he leaves forthwith.

I think these points speak for themselves, but I may add that my Local Medical Committee feel so strongly on the first point that it has refused to make any nomination to the Local Obstetric Committee.—I am, etc.,

SIDNEY F. FOURACRE,
Chairman, E. R. Yorks Local Medical Committee.

Withernsea, Yorks.

The Young Doctor

SIR,—One reads in your columns of the acute shortage of general practitioners in the country at the present time. This surprises me, because one has only to look in the advertisements section of the *B.M.J.* to observe that there are frequently far more doctors desirous of purchasing practices or shares than there are wishing to dispose of them. At the same time the medical agencies say that good practices and even assistantships are very difficult to obtain. What, then, is the young doctor to do—particularly the newly released Service M.O.? These are the men whose pathetic advertisements constitute the main part of your "Practices and Partnerships Wanted"

columns. As a profession we are all passing through a trying phase now, but the young doctor, especially if he is married and is not yet in general practice, is in my opinion in a far worse position. He has no post (and he is quite prepared to start at the bottom of the ladder) and has no alternative but to enter the scheme, even though he may be opposed to it in principle.

I do not wish to criticize my more experienced and older colleagues, but surely it is the young man now who will be the "backbone" of the profession in, say, twenty or thirty years' time, yet little is being done for him. In fact, the young man is left out of all the discussions, and what would possibly be his only means of support for some time—namely, the £300 basic salary—was one of the major points around which the acceptance or refusal of the scheme revolved. I feel that the younger doctor, particularly the ex-Serviceman, should be given every consideration by the B.M.A. in his quest to do the right thing. He cannot possibly do this while he and his wife go hungry. There are many who are only too willing to join the ranks of the profession and reduce the shortage of G.P.s, but it is fast becoming increasingly difficult to do so. While their elders talk, the young men are simply registered medical practitioners, and very little else.—I am, etc.,

G. J. E. ANSELL,
Flight Lieutenant, R.A.F.V.R.

Breach of Confidence

SIR,—I should be interested to learn, as I expect would many of your readers, what is my legal position should I complete Ministry of Food Form R.G. 50A and forward it, as stated at the bottom of the form, to the Food Office. It seems to me that this form treated in that way would constitute a clear-cut breach of confidence, since the diagnosis is clearly stated together with other intimate details.

Is this perhaps the thicker middle bit of the National Health Service wedge, the thin end of which is to be found in Ministry of Food Form Med. 2, with whose schedules of diseases we are all too familiar.—I am, etc.,

Denham, Bucks. EUSTACE SHIPMAN.

*** After filling in the patient's name and address on Form R.G. 50A the medical practitioner declares that the patient has active infective polyarthritis and states whether there has been loss of weight, what the sedimentation rate is, and when this was estimated.—ED., *B.M.J.*

Go in Whole-heartedly

SIR,—I should like to endorse the opinions and suggestions contained in the letters of Drs. Basil S. Grant (May 1, p. 854), David Hardie, J. B. Mason, R. Preston Hendry, and Kenneth Inman (May 8, p. 898 et seq.)—quite a spate of letters, unfortunately mostly published too late to be read before the voting, voicing the danger of now giving in to the Minister's conciliatory assurances. In the event the unbelievable has happened and our "impregnable position" has been lost or, rather, thrown away. In point of fact, the B.M.A. having splendidly fought a good fight and won it hands down must needs be so shaken in its attitude by a few suggestions by the R.C.P. and a few minor "concessions" by the Minister as to throw all leadership to the winds and abjectly to surrender and to ask the less initiated rank and file to vote in yet another plebiscite, in the hope perhaps of officially liquidating their great majority, so enabling them to advise their followers, after all, to climb down and enter the Service.

What has become of the determination not to enter the Service unless so amended as to allow entrants to retain their "four" freedoms? What leadership! What a let-down! So now, what to do? Obviously there's practically no alternative to going in. That being so, let us go in whole-heartedly, and since we *must* be Civil Servants let us have an all-embracing one. Let it be a salaried one, with graded salaries as in any other reputable service, graded by seniority and influenced by merit, with permission to indulge in private practice, if any, in our spare time, if any, and so one wherein the senior man may reap some reward for his experience and more valuable opinion as compared with that of the young just-qualified tyro in the profession. For surely a capitation method of remuneration, whereby the only way in which a more competent senior man may make a sufficient income is by scrabbling for more heads, is absurd and ridiculous.

If it be objected that a salaried service would do away with the freedom of choice by the public, the answer is that if the public care so little for the freedoms of the doctors the latter need scarcely care about the freedom of the public. Further, since the Act is a totalitarian measure, freedom is abolished anyhow and need no longer be argued about, and since in a few years the role of the G.P. will be merely that of positive direction of a patient to the appropriate department of the general store of "trained specialists," whence he will again be directed to department and department—as long as he lasts—even the importance of freedom of choice will soon disappear, and all, save perhaps the patient, will be happy again.—I am, etc.,

Thame, Oxon. C. H. BARBER.

Refuse Service

SIR,—There is all the essence of tragic drama in the reflection, requiring no great stretch of imagination, that had your leading article in the *Journal* of May 8 (p. 885) appeared a fortnight ago the future history of medicine, and even of events outside it, might have been changed. In what I can only suppose is your anxiety to be democratic the tone of recent articles has been studiously non-committal. But in these days even that idealistic fantasy, democracy, cannot afford to dispense with the aid of propaganda—or dare we call it leadership? The impression left upon the mind was one of hopelessness, with an inference that the terms offered were the best that could be gained and should be accepted. I have no doubt that a good deal of criticism and bitterness will make itself felt at the forthcoming Representative Meeting, and in my view it will be fully justified. In all my life and experience I have never known such a deplorable lack of decisive generalship at the moment of crisis.

Is this once again the poisonous fruit of divided counsels and of mutual distrust between leaders and rank and file? Even now I feel that all is not lost if the Representative Meeting will insist that doctors be recommended not to accept service unless and until terms fully safeguarding the freedom of medicine are obtained.—I am, etc.,

Wirksworth, Derbyshire. E. D. BROSTER.

Postpone Appointed Day

SIR,—If 2,500 G.P. doctors disapprove of the new Health Act why in the name of Heaven don't they stand together and as a body decline service under the Act until such a time as they can see an Act of which they can approve? It is not too late yet. Let us all flood the B.M.A. office with letters or postcards *demanding* that the appointed day be postponed, and absolutely declining to be rushed into joining on July 5 on the grounds that it is quite impossible by that time to discuss the terms of service; and that we will refuse to accept service until we know and agree to the full terms and conditions under which we have to serve.

It is difficult to see why the B.M.A. had another plebiscite at this juncture. The result has been deplorable. It strengthened nobody and only succeeded in splitting the profession and throwing large numbers of us into confusion and misunderstanding of the real purpose of the B.M.A.'s action. This was evidenced at a large meeting of medical men at Nottingham on April 25. It began with several doctors pleading that as Bevan had been so "good" as to meet us half-way we ought not to hold out any longer, but accept service. It ended with a unanimous vote (with only one dissentient) against accepting service.

The last plebiscite has so far only played into Bevan's hands. It is just what he wanted—to split the profession, to throw them into confusion, to make them timid and afraid to stand out in case they should lose. He threatens them with severe penalties if they do not join in July—and to keep them in ignorance of the real facts of the situation as long as possible. We have only had our printed terms of service practically flung at us a fortnight, which will take a long time to read, digest, and discuss, thus hoping that out of the confusion we should fling ourselves at last into dear Father Bevan's arms like naughty penitent children, who had been so patient and kind in granting us one and a half of our four *basic* demands.

Bevan didn't give way because he loved us but because we forced him to do so when he saw 25,000 doctors pledged not to give service. Why stop now? Do let us show some of the grit which Bevan and his confrères show when they demand anything. Refusal to be rushed into the Service on July 5 does not necessarily commit us to accepting service at some later date. Don't let us act like "medical quislings" to our colleagues for fear or a little temporary gain. If we stand firmly together and decline service, we can't lose. We are bound to get what we want—i.e., professional freedom for ourselves and for the public. Don't sign in haste and repent at leisure. If Bevan beats us now, the profession will be beaten and degraded for ever. The public are being grossly misled by Bevan's present furious propaganda stunt.—I am, etc.,

Tuxford, Notts. ALLAN DEWAR.

Postpone Service

SIR,—We voted "No" in February and frightened the Minister into making some concessions. If only we had voted "No" again just as decisively we should have frightened him into meeting all our reasonable demands. Instead of this we have been timidly retreating ever since last February as if scared by our success.

If the Council's recommendations are passed by the Representative Meeting we shall have thrown away our last vestige of bargaining power, and this at a time when the specialists' terms of service have not even been discussed. The Minister will negotiate, of course; but, with the sure knowledge that he has got the whole profession "in the bag," it must be obvious even to the most innocent doctor that it will be done in a manner even more intransigent than that of last December. Do let us realize that once G.P.s have signed on, or been recommended to sign on, the whole profession—specialists and G.P.s—will be completely powerless to influence him in any way whatever. The specialists will have had their hospitals taken over, the G.P.s will be bound by their contracts, and all of us rendered impotent by the stupidly publicized boast that "the doctors will never strike." Negotiations will be a misnomer for what will take place.

While it is now inevitable that we shall eventually have to accept service in the scheme, we must maintain some hold over the Minister until negotiations are complete. There is one way in which this can be done—a way which would satisfy the vast majority of the profession, and which could be accepted by the Minister without losing face. Let the Representative Meeting pass a resolution stating that doctors will be recommended to accept service provided the appointed day is postponed until the amending legislation has been agreed, passed, and become law; until terms of service for specialists have been agreed and settled; and until the other minor points (such as a definite, known capitation fee) have been arranged.—I am, etc.,

London, N.W.6. RONALD KERR.

Delay Entry

SIR,—It would appear that one-half of the medical profession will be asked to relinquish conscientiously held vital matters of principle in order to facilitate an admittedly unsatisfactory start to a service which is almost universally disapproved. This is an unjustifiable concession to ask from this half of the profession. Though we cannot unite we can still co-operate and strongly support one another each in our own place.

I would suggest that all doctors unwilling to enter the Service as it is should agree to exercise their legal option to stop outside until Sept. 30. This would be of great assistance to the Negotiating Committee in keeping before the mind of the Minister the dissatisfaction of the profession. The general practitioners stopping outside would have the opportunity of bolstering up their courage—and encouraging the Minister—by collecting cards for registration on Sept. 30. The Minister would also have an opportunity to consider whether it might be useful for him to conciliate those intransigent doctors who may still be able to postpone their entry into the Service until Dec. 31.

We must give our negotiators some power to negotiate with: 52% of the profession is a useful lever. We can of course trust one another to play the game about accepting names for registration—and securing "no victimization."—I am, etc.,

Crowthorne, Berks. H. D. FORBES FRASER.

Planned Chaos

SIR,—In these days of strange events a 65% vote of disapproval is interpreted by the B.M.A. Council as warranting a recommendation that we should now accept service. Thanks to our medical oligarchs and to the threat of financial sanctions it seems that orderly evolution in the British tradition must soon give way to planned chaos in the neo-European manner. The whole-hearted co-operation which could have been forthcoming in such full measure will be replaced by reluctant and apathetic acquiescence or by futile opposition. Unless there is a return to common sense at the eleventh hour many of us will apply to ourselves the adage *video meliora proboque, deteriora sequor*.—I am, etc.,

Hessle, E. Yorks. R. HERMON.

Rota of Pharmacies

SIR,—The British Medical Association has done a good job of work in connexion with the National Health Service Act and still has much to do. May we hope that in this coming task attention will be drawn to the need of patients' being able to obtain medicine at suitable hours? At present the pharmacies appear to close more or less at the same times as shops which do not supply urgent products. Can there not be a rota?—I am, etc.,

London, N.W.11. L. S. WOOLF.

POINTS FROM LETTERS

Ante-partum Haemorrhage

Mr. W. I. C. MORRIS (Edinburgh) writes: Dr. Tim Boland (May 1, p. 859) comments upon the use of the vaginal pack in ante-partum haemorrhage, as reported in your summary (April 17, p. 748) of the Edinburgh Obstetrical Society's Meeting on March 10. On behalf of my friend and successor in Ayrshire, Dr. Richard de Soldenhoff, I would like to point out that the report (of which I blushingly admit the authorship) was extremely abbreviated. It is hoped that eventually a fuller report will be published in the *Edinburgh Medical Journal*. If Dr. Boland has an opportunity of reading this, it may be that his condemnation will be less indignant. To understand all is to forgive all.

Accidental Syphilis

Dr. M. G. KIERANS (Clones, Eire) writes: Dr. R. R. Willcox, in his interesting article on accidental syphilis (May 1, p. 850), mentions a number of ways it may be acquired. I should like to mention another. A policeman bringing a prostitute to the station is very likely to be bitten by her and so become infected. This happened to a patient of mine.

Self-government

A correspondent draws attention to the following after-dinner message of good wishes from Sir James Paget to the British Medical Association at its Jubilee meeting in August, 1882: "There has never been anything like a recession from the great principles on which it started. It has been constant in its steady advance; constant in its usefulness; constant in the influence that it has exercised upon the profession; constant, best of all, in the promotion of knowledge and good feeling amongst all the members of our calling. . . . I hold that our great anxiety, our great strife, should be, to be a self-governed profession; to know our own wants, and not to go to others to help us; to find out the remedies for ourselves; to find out by careful, patient controversy, and mutual concessions, how we may, without any external help, bring about the results which the best and the largest number of us wish for. Let us be, as all highly cultivated persons should be, self-governed. None can know so well as ourselves our need; none can know so well the remedy we require. It tells of feebleness, of cowardice, and want of self-reliance when we want to go to any parliament living to help us."—*Memoirs and Letters of Sir James Paget*, edited by Stephen Paget. London: Longmans, Green and Co. 1901. Pp. 320–1.

The April Plebiscite

Dr. A. R. THATCHER (Bournemouth) writes: . . . It is completely incomprehensible to me that in an unmandated plebiscite, rushed through on the strength of the capitation concession principally, a number of practitioners should have panicked. Do they not realize that the time to demand a 1948 remuneration—not the 1939 Spens offered by the N.H.S.—is before they enter the Service and not afterwards when they are in the power of the Government? I sympathize with the dilemma of those in strictly industrial practices, but would urge them to await the approval of the majority before throwing away their advantages.

Obituary

PROF. A. H. BURGESS, M.Sc., F.R.C.S., LL.D.

Mr. John Morley writes: The Fellows of the Association of Surgeons of Great Britain and Ireland were greatly shocked when their president announced at the dinner of the Association on May 6 that Prof. Burgess had died suddenly after his arrival in Edinburgh for the meeting. Burgess's reputation among surgeons all over the world had been a remarkably high one for wellnigh forty years, and many of those at Edinburgh felt keenly the loss of a personal friend.

It was at Crumpsall that he made himself an expert in the use of the newly invented catheterizing cystoscope by assiduous practice on the cadaver. His senior colleagues and chief rivals in practice never mastered this instrument, and Burgess's remarkable skill in using it soon brought him the best urological work in Lancashire and Cheshire. Although urology was one of his main interests throughout his active surgical career, he never became a urological specialist but remained a supremely competent general surgeon. He had deserved early success and it came with a rush. At the early age of 31, in 1905, he was elected honorary assistant surgeon to the Manchester Royal Infirmary. Five years later he was on the senior staff. He held the post of full surgeon for twenty-four years, until he became consulting surgeon in 1934. He was appointed Professor of Clinical Surgery in 1921 and became Professor Emeritus in 1934.

No other Manchester surgeon has ever had, or is likely to have, as large a private practice as Burgess had throughout his long and strenuous life, but he never let the claims of private patients interfere with his Infirmary or University work. The strain on him must have been immense, but he had a magnificent physique and did not appear to know the meaning of fatigue. To the last he kept his erect military bearing and walked with a quick purposeful gait so characteristic of the man. He will not be remembered as a great philosopher-surgeon, or as the first to describe some new disease, but as the supreme craftsman, the chirurgeon (or hand-worker) *par excellence*. His greatest triumphs were rather in the operating theatre than in the consulting room or at the lecture desk. He was a good, clear lecturer and never scamped his preparation, but he lacked the tricks of rhetoric. To watch him operate, or still better to assist him, was an aesthetic and intellectual treat. His strong shapely hands possessed rare economy of movement, so that he was a quick operator without ever seeming to be in a hurry. He fought, and won, the local battle for a full aseptic ritual in the operating theatre against the views of senior colleagues who were apt to regard gloves as only needed to protect their hands from pus, and caps and masks as either fads or unnecessary luxuries. He was always keen and enthusiastic and ever on the look-out for some improvement in surgical technique. In this search his many journeys with the Moynihan Chirurgical Club, of which he was an original member and in due course president, were of the greatest value. He hardly ever missed one of its meetings, and from nearly all of them, at home or abroad, he brought back some addition to his surgical technique.

Perhaps Burgess's outstanding characteristic was his intellectual and moral integrity. He was as conspicuously upright in character as he was in carriage. No one ever suggested that he cooked his statistics, nor would he ever descend to a mean or tortuous act. His many acts of kindness and generosity to patients or junior colleagues were done with modesty and almost with diffidence. He was essentially a simple, humble-minded man, and he had an unusually happy life. Magnificent health, the consciousness of work well done that deserved and commanded success, and above all a singularly happy family life combined to secure this. The death of his wife in 1941, to whom he was as utterly devoted as she to him, inevitably left him a rather lonely man despite his lively interest in his children and grandchildren. He sought, and found, solace in work—as he was never idle—and in his gardening and music.

Mr. ARNOLD CADDY died on April 15 at the age of 81 in Melbourne, Australia. He was the son of the late Inspector-General of Hospitals and Fleets, John Turner Caddy, R.N., and was educated at King's College School when it was still in the Strand. He often used to journey to school by "penny steamer" from Battersea Pier. He proceeded to St. George's Hospital, where he qualified in 1887. Mr. Caddy held house appointments at North Lonsdale Infirmary, at Barrow, and at the Leeds General Infirmary. There he came under the influence of Mayo Robson and of Lord Moynihan, who were then beginning their successful careers. After holding these posts he returned to London, took the F.R.C.S. in 1891, and was appointed assistant surgeon to the Cancer Hospital in Fulham Road. Shortly afterwards he was offered a lucrative appointment in Calcutta as a partner of the late William Coulter. He practised there for twenty years and was on the staff of the Marwari Hindu Hospital. He then retired to Australia in 1912. Caddy had married an Australian girl, the daughter of the late Archibald Currie, of Melbourne. He forsook medicine entirely and went in for farming in Victoria. Interested in Red Poll cattle, he founded his own herd and was president of the Red Poll Cattle Association of Australia, winning a championship at the Royal Melbourne Show with his bull Chanpara Valentine. On one occasion he judged at the Chicago International Livestock Exposition. Arnold Caddy was an officer in the Calcutta Light Horse for many years, and during the first world war was in charge of a reinforcement camp of the Victorian Light Horse. He leaves a widow, two sons, and a daughter. The elder son is a gunner colonel in the British Army and is now attached to the rocket bomb installation in South Australia. The second son was in the Australian Forces and was captured at Singapore. He worked on the notorious Bangkok-Moulmein Railway and then in coal mines in Japan before he was released.

Dr. DAVID MURRAY STRATHIE died suddenly at Guy's Hospital on April 18, at the age of 28. He was born in Glasgow and educated at Rugby School, where he was head of his house and captain of the rugger XV. He was a scholar at Trinity College, Oxford, and won his rugger blue in 1939. He entered Guy's Hospital in 1940, and graduated B.M., B.Ch. in 1943. After qualification he held house appointments at Guy's for twelve months before joining the Navy. For a time he was attached to a Naval Rehabilitation Centre on the East Coast of England, and later served in South Africa. He was secretary of the Guy's Hospital Rugby Football Club in 1941–2 and captain during the season 1942–3.

Dr. CYRIL HERBERT THOMAS ILOTT died on April 26 at the age of 68 at Bromley, Kent. He retired only a month ago, and was admitted to hospital only three days before his death. Dr. Ilott was the last medical member of a family of physicians which served the Bromley area for nearly 150 years. Mr. Thomas Ilott, a surgeon, settled in Bromley in 1809. He died in 1849, and was succeeded by his son, who in his turn was followed by the father of Dr. Cyril Ilott. Dr. Ilott was educated at Tonbridge and at Caius College, Cambridge, and St. Bartholomew's Hospital. He qualified in 1906 and graduated M.B., B.Ch. two years later. He was a house-surgeon at the Metropolitan Hospital and a clinical assistant at Great Ormond Street before going into general practice with the firm of Ilott, Scott, and Grant-Wilson. He succeeded his father as Metropolitan police surgeon in 1916, and continued in that capacity until last year. During the 1914–18 war he served in the R.A.M.C. in France and Belgium until he was badly gassed towards the end of the war and had to be invalided home. He had been a member of the board of governors of Bromley and District Hospital since 1928, and in recent years was chairman of the medical staff committee. He was also a member of the Kent Panel Committee.

C. J. M. writes: The death of Dr. Cyril Ilott on the eve of his retirement was a tragedy deplored by a host of friends and colleagues at the Bromley and District Hospital; a short but oppressive illness ended a life of devoted and kindly service to patients and hospital. He had warnings of his danger, but he died in harness in the hospital around which his life had more and more centred. His death breaks the continuity of a family practice of over a century; he had maintained the tradition of intensely personal interest in every patient of whatever section of society—an interest so meticulous and sincere that the modern psychiatrist would have dismissed him as "obsessional." A similar code of honour characterized his relationships with colleagues—practitioners, consultants, nursing and lay staff—at the hospital. By all he was beloved for his sincerity, kindness, and the simplicity of outlook which so often to the superficially minded conceals a very well stored mind and a critical clinical outlook. We all say "Hail and farewell" to a very dear friend and a very good physician.

Medico-Legal

ALLEGED CONSPIRACY TO PROCURE MISCARRIAGES

TWO DOCTORS ACQUITTED

The trial took place before Mr. Justice Morris at the Central Criminal Court from May 11 to 14 of Dr. Eleonore Bergmann, of Park Square, N.W., and Dr. Mary Bell Ferguson, of Devonshire Place, W., on an indictment for conspiring together unlawfully to procure miscarriage. A third defendant, Mrs. Pauline Mary Evans, who was Dr. Bergmann's secretary, was found "Not guilty" at an early stage in the proceedings and was dismissed from the case. The proceedings at Marylebone police-court were recorded in our issue of April 17 (p. 762).

Mr. Anthony Hawke, who prosecuted, said that the alleged offences with which Dr. Bergmann was charged related to the use of an instrument to procure the miscarriage of four women between Dec. 16 and Jan. 24 last. Dr. Ferguson was associated with only two of these cases. These two women first consulted Dr. Bergmann, who sent them to Dr. Ferguson, and the latter, after examination, forwarded to Dr. Bergmann a letter expressing the opinion that the operation could be lawfully performed for the reasons she indicated. The question so far as Dr. Ferguson was concerned was whether her opinion was given in good faith or was simply, as Mr. Hawke alleged, to provide a cover for Dr. Bergmann in case of emergency.

The principal evidence for the Crown was that of the four women concerned, whose names were not divulged. Their evidence was summarized in our earlier report. It was stated that the fees received by Dr. Bergmann were in the first case (a nurse) £10, in the second and third cases £75, and in the fourth case £50.

Both defendants pleaded "Not guilty." Dr. Bergmann, in reply to Mr. G. D. Roberts, K.C., her counsel, said that she was born in Germany in 1907. She qualified in 1933 and set up as a general practitioner in Edgware; afterwards she had consulting rooms in Park Square. She had never met Dr. Ferguson before they both stood in the dock at Marylebone police-court, but she had heard about her, her work at Tavistock Clinic, and her high standing in psychological medicine. She had sent a number of patients to Dr. Ferguson for her opinion. Of those which turned on the desirability of terminating pregnancy she could recall six in which Dr. Ferguson had not recommended this course, and the operation accordingly had not been performed. Of the two out of the four cases in which Dr. Ferguson was not concerned, the first was a woman who had made a partially successful attempt at procuring abortion, and on examination Dr. Bergmann was convinced that there was no foetal life. The other was a woman who had had a baby a few months previously and was afraid she was pregnant again, but on examination Dr. Bergmann found that not to be the case, and the curetting which was done was in order to clear up a uterine condition and not to terminate pregnancy. Of the other two cases, one was a haemophiliac and in a shocking condition, and the other in an exhausted and anxious state, complicated by a recent attack of jaundice.

Dr. Ferguson gave evidence that she had been a member of the medical profession since 1910, and for the last twenty years had specialized in the study of mental disorders. A certain number of the cases in which she was consulted were women whose condition was complicated by pregnancy. In January two cases were sent to her by Dr. Bergmann, whom she had never met socially or professionally, and she came to the conclusion in each of these that in the interests of the women the pregnancy should be terminated. This conclusion she wrote in a letter to Dr. Bergmann. Her fee in each of these cases was the regular consultation fee of three guineas, and that was all she received in connexion with this matter.

In cross-examination Mr. Hawke took Dr. Ferguson through the various disabilities which she had set down in her letter on one of the cases and asked whether each of them—exhaustion, digestive trouble, etc.—constituted a reason for performing the operation. Dr. Ferguson replied that her opinion was based on all the various matters added up together—on the general picture, not on a particular item. She admitted that she had first suggested to one of the girls that she should have her baby and get it adopted, but that was before she went fully into her history and condition. This was a psychoneurotic girl who in addition had chest trouble, and she recommended the termination of pregnancy on both physical and mental grounds. One was always reluctant to terminate a pregnancy if this course could be avoided. She gave both certificates in complete good faith.

Mr. Roberts, for Dr. Bergmann, said that while it was vitally important that the unborn should not be unlawfully destroyed, it was equally important that women whose pregnancy, if it was allowed to continue, might disastrously affect their health and endanger their life should be free and able to have their pregnancy terminated under safe conditions. It would be utterly wrong if the result of this case was to deter doctors from doing their duty. He submitted that Dr. Bergmann had full justification in each case for what she did and that she was entitled to leave the court as a member of a free and honourable profession which in all her professional life she had done everything to uphold.

Mr. E. Davies, K.C., for Dr. Ferguson, said that collusion was the essence of the charge against her. What indications were there of any sort of collusion? It was brought out in evidence that it was only after two of the women had told Dr. Bergmann that they had no doctor that she had mentioned Dr. Ferguson's name. There was no suggestion that Dr. Bergmann or Dr. Ferguson shared fees, or that Dr. Ferguson knew that the operation had been performed or where it was performed. She was a woman of unblemished reputation. Was a woman going to sacrifice nearly forty years of honourable service in her profession for six guineas?

Mr. Hawke, in a closing speech, submitted that there was evidence that Dr. Ferguson's certificates were a cloak ready to be produced at the proper time to cover an operation which to the knowledge of the person performing it was unlawful. He pointed out that Dr. Bergmann's story in the witness box, especially with regard to the case which she now said was not pregnant at all, differed from the story she had told the police inspector. The case against Dr. Bergmann was formidable, and Dr. Ferguson must be regarded as accessory to the fact of these operations.

Summing-up

Mr. Justice Morris, in summing up, pointed out that the four women who had given evidence for the prosecution were themselves parties to an alleged unlawful act, and therefore it was highly desirable that there should be corroboration. In the case of one of the women—the woman whom the defence said was not pregnant at all—there was no corroboration of her story that she was. The jury was not concerned in this case, as in so many others at that court, with unqualified people performing this operation, and it must happen from time to time that those engaged in the practice of medicine had to perform, lawfully, operations for the termination of pregnancy. Here his lordship read from the summing-up in the case of *Rex v. Bourne* (1938); although the facts in one case were not of overwhelming assistance in another, they did afford a certain guidance on principle, and it might be helpful to read a few words from the summing-up of the judge in that case (Mr. Justice Macnaghten). After pointing out that the burden rested upon the Crown to satisfy the jury beyond reasonable doubt that the defendant's procurement of miscarriage in the girl was not done in good faith for the purpose of preserving her life, the judge had continued:

"The law does not permit the termination of pregnancy except for the purpose of preserving the life of the mother. I think myself that those words ought to be construed in a reasonable sense. If the doctor is of opinion, on reasonable grounds, and with adequate knowledge, that the probable consequence of the continuance of pregnancy would indeed make the woman a physical or mental wreck, juries are quite entitled to take the view that the doctor who in those circumstances and in that honest belief operates is operating for the purpose of preserving the life of the mother."

"I fully adopt those words," said Mr. Justice Morris, "and invite you to bear them very much in mind."

His Lordship, referring to the certificates given by Dr. Ferguson, said that it was no part of the jury's duty to decide whether she had arrived at a right conclusion on the two cases. A

difference of opinion might obtain between members of the medical profession, and it might be difficult to find out which opinion should be preferred, but the question whether Dr. Ferguson was correct or incorrect in the view she had formed was not for the jury. It was, of course, the fact that the desire of a woman to be relieved of pregnancy was no justification for the performance of an operation. However much a doctor might be tempted or persuaded, whatever appeal might be made to sympathy, he or she must not operate unless to preserve the life of the mother. Dealing with the cases in which both doctors were concerned, there appeared to be no evidence that Dr. Bergmann insisted on Dr. Ferguson as the second doctor; only when one of the women said that she had no doctor of her own was Dr. Ferguson's name mentioned. There was also no evidence that Dr. Ferguson had taken more than the ordinary consultation fees. But the question of collusion had been raised, and it was for the jury to consider it.

After an absence of seventy minutes the jury returned a verdict of "Not guilty" in the case of both defendants. Dr. Bergmann pleaded guilty to a charge of attempted suicide, and was sentenced to eleven days' imprisonment, which meant her immediate release.

Universities and Colleges

UNIVERSITY OF OXFORD

In a Congregation held on April 29 the following degrees were conferred:

B.M.—*G. F. M. Carnegie, *G. O. Jelly.

* In absence.

UNIVERSITY OF MANCHESTER

The following candidates have satisfied the examiners at the examination indicated:

THIRD M.B., CH.B.—*Pharmacology, Pathology, and Bacteriology:* H. G. Arnall, R. M. Ashton, Anne R. Barlow, Margaret Bolland, N. C. Brown, K. D. Buckley, R. B. Charnock, C. Cohen, D. Davies, Audrey E. Draycott, R. B. Haigh, Jean M. Halliwell, F. G. Hardman, H. Holgate, G. M. Ingall, A. G. Jackson, G. Jessup, J. H. Latham, Kathleen M. Lord, I. Macpherson, Lavinia M. Mallott, J. M. Mitzley, A. Noar, Marjorie E. Petch, J. A. Platt, N. E. Quin, R. E. Raworth, Margaret E. Reynolds, Marjorie Rivers, Audrey Seddon, Jeanette S. Shankland, I. Sieff, T. A. J. Thorp, J. M. Watt, A. Wilkinson. *Pathology and Bacteriology*: Mrs. Barbara M. Benson.

ROYAL COLLEGE OF PHYSICIANS OF LONDON

Election of Fellows

At a quarterly comitia of the College held on April 29, with the President, Lord Moran, in the chair, the following were elected Fellows:

Percy Stocks, M.D. (London); F. F. Tisdall, M.D. (Canada); H. L. Heimann, M.D. (South Africa); H. S. Morley, M.D. (Midhurst); G. E. F. Sutton, M.D. (Bristol); K. B. Noad, M.B. (Australia); C. A. Keele, M.D. (London); F. C. Golding, M.B. (London); W. H. McMenemey, D.M. (Great Malvern); J. E. Caughey, M.D. (New Zealand); C. H. Fitts, M.D. (Australia); W. Phillips, M.D. (Cardiff); Ursula Shelley, M.D. (London); N. Ll. Rusby, D.M. (London); I. Shawki (Cairo); F. R. Bettley, M.D. (London); J. E. Debono, M.D. (Malta); M. J. F. McArdle, M.B. (London); C. G. Baker, M.D. (London); T. R. C. Fraser, M.D. (London); C. J. Gavey, M.D. (London); A. L. Banks, M.D. (London); K. M. A. Perry, M.D. (London); Brigadier J. Bennet, M.D. (London); J. S. Richardson, M.D. (London); N. S. Alcock, M.D. (Truro); H. T. Howat, M.B. (Manchester); F. A. Elliot, M.B. (London); J. F. Dow, M.B. (London); K. A. Latter, M.D. (Norwich); R. Lewthwaite, D.M. (Malaya); G. W. Marshall Findlay, M.D. (London); A. R. D. Adams, M.D. (Liverpool); A. M. Jones, M.B. (Manchester); Dorothy S. Russell, M.D. (London); D. M. Dunlop, M.D. (Edinburgh).

Dr. Helen M. M. Mackay was appointed representative to attend the Annual Conference of Maternity and Child Welfare, June 23 to 25.

A Report of the Prophit Tuberculosis Survey was received.

Membership

The following candidates, having satisfied the Censors' Board, were elected Members:

R. H. Andrews, M.B., S. T. Anning, M.D., C. E. Astley, M.D., E. H. Back, M.B., A. J. Bailey, M.B., D. Banerji, M.B., R. G. G. Barry, M.D., N. C. Begg, M.B., J. N. Berry, M.D., M. C. Binnie, M.B., L. G. Blair, L.R.C.P., D. J. Brennan, M.B., E. J. S. N. Briggs, M.B., D. B. Buckley, M.D., J. S. Calnan, L.R.C.P., E. F. Carr, M.B., L. W. Carstairs, M.B., J. R. Carter, M.B., T. M. Chalmers, M.B., R. B. Coles, M.B., N. F. Crofts, M.B., P. G. Dalgleish, M.B., F. J. Davidson, M.B., J. H. Deakin, M.B., J. T. M. De Villiers, M.B., J. Donnellan, M.B., R. G. Dreadon, M.B., B. K. Ellenbogen, M.B., Surgeon Commander F. P. Ellis, M.D., R.N., B. Epstein, M.B., J. W. Fawcett, M.B., Charlotte Feldman, M.B., D. Foskett, M.B., J. H. Gear, M.B., J. A. Glover, M.B., R. R. Gordon, M.B., A. A. Guild, M.B., A. H. M. Halim, J. D. L. Hansen, M.B., J. H. S. Heller, M.B., A. G. Hesling, M.B., D. Hilson, L.R.C.P., F. W. B. Hurlburt, M.D., R. E. Irvine, M.B., J. Isbister, M.B., F. S. Jackson, M.B., J. H. Jacobs, M.B., S. Jacobson, M.B., H. R. Jolly, M.B., E. O. W. Jones, L.R.C.P., J. W. Jordan, M.B., S. L. Kave, M.D., W. E. King, M.D., R. Kirk, M.D. (*in absentia*), P. O. Leggat, M.B., V. M. Leveau, M.B., R. D. K. Levy, B.M., T. R. Littler, M.B., D. L. Lloyd-Smith, M.D., J. Lorber, M.B., D. Lurie, M.B., Vivien U. Lutwyche, M.B., B. E. McConnell, M.B., R. Macpherson, M.B., D. Macrae, M.B., J. Marks, M.B., R. Marshall, M.B., D. Micklewright, B.M., Alison M. Miles, B.M., J. P. D. Mounsey, M.B., G. A. Newsholme, M.B., G. D. Owen, M.D., W. J. Penman, M.B., E. J. T. Prettejohn, M.B., R. D. Puflett, M.B., J. F. P. Quinton, M.B., C. S. Rennie, M.D., J. M. Rice-Oxley, B.M., M. J. Riddell, M.B., F. L. Ritchie, M.B., L. M. Rose, B.M., F. F. D. Rosenthal, M.B., N. J. Roussak, M.B., E. Sanders, M.B., T. R. Savage, B.M., Daphne M. Scott, M.B., V. V. Shah, M.D., J. Sharp, M.B., G. M. Shy, M.D., C. P. Silver, B.M., Daphne Smith, M.B., I. O. B. Spencer, M.B., D. G. H. Stone, M.B., G. O. Storey, M.B., W. S. Suffern, M.D., G. F. Swann, M.B., P. N. Swift, L.R.C.P., W. K. Taylor, L.R.C.P., R. Tepper, M.B., J. W. Thompson, M.D., J. J. Tillie, M.B., R. H. Townshend, M.B., R. S. Weetch, M.B., H. N. B. Wettenhall, M.D., L. A. Wilson, M.B., P. A. O. Wilson, M.B., G. E. Wodehouse, M.D., O. H. Wolf, M.B., C. J. Zerny, M.B., F. Ziady, M.D.

Licences

Licences to practise were conferred upon 130 candidates (including 32 women) who had passed the final examination in medicine, surgery, and midwifery of the Conjoint Board and who have complied with the necessary by-laws. The names of the successful candidates are printed below in the report of the meeting of the Royal College of Surgeons of England.

Diplomas

Diplomas in Tropical Medicine and Hygiene, in Child Health, in Ophthalmic Medicine and Surgery, in Physical Medicine, and in Public Health were granted, jointly with the Royal College of Surgeons of England, to the following successful candidates:

DIPLOMA IN TROPICAL MEDICINE AND HYGIENE.—M. S. Holman and the 37 other candidates whose names were printed in the report of the meeting of the Royal College of Surgeons of England in the *Journal* of April 24 (p. 813).

DIPLOMA IN CHILD HEALTH.—H. S. de Silva and the 121 other candidates whose names were printed in the report of the meeting of the Royal College of Surgeons of England in the *Journal* of April 24 (p. 813).

DIPLOMA IN OPHTHALMIC MEDICINE AND SURGERY.—To the 65 candidates whose names were printed in the report of the meeting of the Royal College of Surgeons of England in the *Journal* of April 24 (p. 813).

DIPLOMA IN PHYSICAL MEDICINE.—B. E. Brocks, I. H. M. Curwen, W. F. Dunham, F. B. Edmundson, E. F. Mason, N. R. W. Simpson.

DIPLOMA IN PUBLIC HEALTH.—A. W. Mearns.

ROYAL COLLEGE OF SURGEONS OF ENGLAND

At an extraordinary meeting of the Council of the College held on April 28, with Sir Alfred Webb-Johnson, Bt., President, in the chair, Prof. Brian Windeyer was co-opted to the council as a representative of radiology.

Sir Hugh Cairns, the first of the Arthur Sims' Commonwealth Travelling Professors, who had recently returned from Australasia, handed to the Council a copy of the Australian reprint of Jenner's *On Cow-pox*, a gift to the College from the Royal Australasian College of Surgeons.

Diplomas

Diplomas of Membership were granted to the following successful candidates:

J. A. S. Amos, J. A. Archer-Hall, Marion M. Ashforth, F. Ashton, G. D. Banyard, S. Basu, Phyllis M. Batchelor, Josephine Batey, S. J. Beales, R. L. Bell, R. C. T. Bellamy, M. J. Bhavnani, J. Bihari, M. D. M. Bowen, Jean M. Boyd, H. E. Braun, R. H. Brayshaw, H. C. Brown, F. Brun, W. W. Bryett, J. D. Bury, P. O. G. Butler, Cicely I. Butterworth, J. Caisley, Joan M. China, P. H. Coldwell, P. C. Conlon, L. Coueslant, Christian R. Cumming, P. Darby, F. J. Davis, L. R. Davis, E. Ll. Dawe, J. V. Deakin, P. F. Doherty, M. J. F. Donovan, P. H. Drake, V. G. Edwards, Mary McA. Elias, Sylvia C. Ellison, P. Freedman, D. E. I. Friedman, L. K. Garstin, Annie I. M. A. Gregory, I. W. de G. Gregory, J. A. Griffiths, Barbara G. Grime, R. L. Grynoch, Eve Hammer, J. J. Handler, Betty P. Harris, F. C. Harris, H. W. L. Harrison, W. J. Hatton, C. E. D. Hearn, Cherry D. Heath, J. D. E. Heighway, P. G. Hill, J. E. Jacques, D. A. James, Nancy C. Janes, J. S. Jenkins, Joan E. Jermyn, Daphne G. Jones, N. Kennedy, Catherine E. Large, G. N. Lumb, Flora Macdonald, E. L. Magee, Joan Marshall, Elizabeth A. Martin, G. C. Mathers, Anne D. Mellor, G. R. J. Moodie, A. D. Moore, H. S. Moore, D. J. R. Morgan, B. J. Ll. Moss, Elizabeth M. W. Mostyn, T. O. W. Myrddin-Evans, J. F. Nunn, R. H. P. Oliver, D. S. Parken, M. S. N. Pathy, W. Peters, G. W. Piper, K. A. Porter, Jean M. Randall, S. K. Ray, P. A. Read, Alison D. Reid, H. R. C. Riches, D. W. T. Roberts, J. Roper, L. J. Rubinstein, L. Russell, Pamela D. Rustim, J. J. T. Ryan, D. Sacks, D. E. G. Sayers, B. U. F. R. Seneviratne, R. G. Shorter, A. K. Siddiqui, B. J. Silkoff, J. A. Slattery, P. J. D. Snow, Jean P. Spalding, Betty J. Spedding, W. Stern, D. C. Stevenson, Mary L. Stokes, C. M. Sutherland, C. G. W. Sykes, Anita J. Thomas, E. T. Thomas, Mary E. Tomlinson, D. G. H. Tutton, K. Tuxford, G. D. Tweedy, A. E. P. Twort, P. S. Vassar, Kathleen E. Wallace, R. W. Wallis, P. D. Warren, G. H. Warrick, H. J. C. Watson, R. J. A. Webb, L. J. Wood, V. P. Wordsworth, J. Zamler.

Diplomas in Physical Medicine were granted, jointly with the Royal College of Physicians of London, to the following successful candidates:

B. E. Brocks, I. H. M. Curwen, W. F. Dunham, F. B. Edmundson, E. F. Mason, N. R. W. Simpson.

ROYAL COLLEGE OF PHYSICIANS OF EDINBURGH

At a quarterly meeting of the College held on May 4, with the President, Dr. W. D. D. Small, in the chair, Drs. H. A. Raeburn (North Berwick), G. M. Wilson (Edinburgh), and D. N. Dobbie (Bromley, Kent) were introduced and took their seats as Fellows of the College. Drs. E. H. Duff (Selkirk) and E. K. Morris (Edinburgh) were elected Fellows of the College.

Drs. R. C. L. Batchelor (Edinburgh), C. W. Clayson (Lochmaben, Dumfries), J. F. Galpine (Coventry), R. J. McGill (New Milton, Hants), J. E. A. David (Bulawayo, S. Rhodesia), Yu Hans Tang (Hong Kong), V. Solomon (Johannesburg), G. W. Senter (Edinburgh), W. S. Thomson, Jr. (Leicester), M. R. Clarke (Capetown), C. G. Williams (Durban), K. J. Dunlop (Edinburgh), T. B. Binns (Middlesbrough), A. V. Bird (Johannesburg), R. J. G. Sinclair (Edinburgh), J. O. Forfar (Dundee), M. Medalie (Johannesburg), D. K. Stevenson (York), J. R. Fountain (West Hartlepool), I. D. B. Bottomley (Wallasey), D. Hilson (London), K. Greenwood (R.A.M.C.), B. B. Manna (Bengal), F. L. Ritchie (Sydney), H. Shrand (Capetown), and Beatrice M. Wilson (Edinburgh) were elected Members of the College.

The Lister Fellowship (value £100), for original research carried out in the laboratory of the College, was awarded to Dr. T. W. Lees (Edinburgh).

Dr. Douglas Kerr was re-elected Representative of the College on the General Medical Council for a period of five years.

SOCIETY OF APOTHECARIES OF LONDON

The fifth Joseph Strickland Goodall Memorial Lecture on Cardiology will be delivered by Prof. John McMichael, M.D., F.R.C.P.Ed., Director of the Department of Medicine, Postgraduate Medical School of London, at the Apothecaries' Hall, Black Friars Lane, Queen Victoria Street, London, E.C., on Thursday, June 3, at 5 p.m. His subject is: "The Pharmacology of Heart Failure." Members of the medical profession and senior students are invited to attend.

Medical Notes in Parliament

The Report of the Inter-Departmental Committee on the remuneration of general dental practitioners was presented to Parliament on May 11.

The Factories Bill and the Veterinary Surgeons Bill, both of which have passed the House of Lords, were read a first time in the House of Commons on May 11.

Mental Deficiency Regulations dated May 10, 1948, were laid on the Table of the House on May 12.

The National Insurance (Industrial Injuries) Bill was read a second time in the House of Commons on May 12.

National Insurance Contributions

Mr. ERROLL asked on May 13 how much of the weekly insurance contribution payable by the individual on and after July 5 would be a contribution to the Health Service.

Mr. STEELE answered that Section 37 of the National Insurance Act provided for lump sum payments to be made out of the National Insurance Fund to the Exchequer as a contribution towards the cost of the National Health Service. These lump sum payments were financed by allocating 8½d. out of each weekly National Insurance contribution paid by an employed man and 6½d. by an employed woman. In addition, 1½d. of the employer's contribution was allocated to the National Health Service. In the case of self-employed and non-employed persons the corresponding allocations were 10d. for a man and 8d. for a woman.

Special Procedure

On May 13 Sir ERNEST GRAHAM-LITTLE asked the Minister of Health which existing committee fulfilled the request by the Royal College of Physicians, which he promised to consider, for a special procedure by way of a committee to provide a check on the issue of Regulations such as would determine the qualifications, remuneration, and conditions of service of doctors and dentists under the National Health Service Act, 1946.

Mr. BEVAN replied that the present procedure, under which all Regulations had to be examined by a special committee in Parliament, coupled with his undertaking to remove from the scope of Regulations a full-time salaried general practitioner service, should be sufficient to remove any apprehension on this point.

Choose Your Doctor Now

Sir JOHN MELLOR asserted on May 12 that the phrase "Choose your doctor now" in a pamphlet to which he had drawn attention was meaningless at the present time. He asked whether Mr. Bevan knew that the London Executive Council asked inquirers to call again in a month, by which time it hoped that the difficulties would be removed.

Mr. BEVAN promised to inquire at once to find whether the London Executive Council was giving that advice. He was fairly certain that the allegation was untrue and that Sir John Mellor was misinformed. He thought all members of the House were now anxious to facilitate the starting of the Act on July 5.

Mr. ASSHETON asked if Mr. Bevan knew that whereas some propaganda put forward by his Department advised the public that lists of doctors could be found in post offices, these lists could not be found there.

Mr. BEVAN said the lists would appear in post offices and town halls as they were filled up by doctors applying to join the Service. There was obviously some delay among certain doctors at present, but they were participating in larger and larger numbers. It was to the financial interest of the doctors to get these lists filled as early as possible. As soon as the doctors had indicated their intention of participating in the Service their names would be put in the places indicated by the leaflet. He added, "We must have the support of the public and medical profession unless great inconvenience is to be caused to millions of people."

Mr. DRIBERG said public-spirited doctors in places such as Maldon had made public their intention of coming in, and the only difficulty was that the supply of application forms ran out at post offices because of the enthusiasm of the public.

Mr. BEVAN promised to see that the supplies of leaflets marched with the mounting enthusiasm. Answering Squadron-Leader FLEMING, he said the House had been speaking about general practitioners and not of specialists and consultants, who were attached to Regional Boards and teaching hospitals.

Children's Bill

The Children's Bill, which had passed the House of Lords, was read a second time in the House of Commons on May 7. During the discussion Dr. HADEN GUEST said the feeling in the minds of medical officers was that in no circumstances must the power be taken from local authorities to go into premises to see the children and to inspect the premises.

The Nurseries and Child-Minders Regulation Bill was read a first time in the House of Commons on May 6.

Mr. STRACHEY said on May 10 that steps recently taken by the Ministry of Food should ensure that reasonable supplies of the various brands of infants' foods were available in all districts. National dried milk was readily available in all areas.

A resolution approving the Purchase Tax No. 1 Order, 1948, on drugs and medicines was moved by Sir STAFFORD CRIPPS on May 6 and was carried without debate.

Exchange Control Medical Advisory Committee

Commander NOBLE on May 11 asked how many people suffering from tuberculosis and recommended treatment in Switzerland had been refused the necessary exchange during the past twelve months.

Mr. GLENVIL HALL said that of 1,317 cases considered by the Exchange Control Medical Advisory Committee since its formation in December last, 22 involving tuberculosis of all types were not considered suitable cases for which currency should properly be provided.

Shortage of Beds.—Mr. BEVAN stated on May 13 that hospital authorities returns at Dec. 31, 1947, gave the number of vacant beds for which staff was not available as 61,146. This was about 2,000 less than the corresponding figure at Sept. 30, 1947. He added that his Ministry was doing what it could to remedy the shortage of nurses.

Opticians Register.—Mr. MITCHISON asked on May 13 whether Mr. Bevan had considered representations from the Joint Emergency Committee of the optical profession asking that provision should be made by legislation for the registration of opticians. Mr. BEVAN said that Mr. Woodburn and he proposed to set up an Inter-departmental Committee to consider and advise whether such legislation would be to the public advantage and if so how registration could best be carried out and what qualifications should be required as a condition of registration. They would consult the professions concerned as to the constitution of the Committee.

Mental Defectives.—The number of mental defectives in public institutions on Jan. 1 was 53,207. The number awaiting removal to institutions on that date was 3,905.

EPIDEMIOLOGICAL NOTES

Notices to Travellers

Australia.—Travellers to Australia by air are not now required to produce cholera vaccination certificates, except in the case of persons who began their journey in India or Pakistan. Persons who begin their journey in Great Britain and traverse India or Pakistan by air, or persons who initiated their journeys in Egypt, no longer require to be inoculated against cholera.

America.—The United States Public Health Service requires from each person entering the U.S.A. a smallpox vaccination certificate showing that vaccination was done not more than three years previously; the certificate must include a note on the reaction observed. These regulations apply to all travellers, including Government officials and diplomatic officers. Failure to present a valid certificate renders the traveller liable to vaccination on arrival or a period of observation (isolation). Travellers are advised to obtain an international form of certificate.

Discussion of Table

In *England and Wales* measles was the only infectious disease with a large increase in incidence; the notifications exceeded the total of the preceding week by 1,077. Decreases were recorded in the notifications of dysentery 133, acute pneumonia 47, diphtheria 45, whooping-cough 43.

The largest increases in measles were those of Surrey 174, Essex 155, Durham 147, Yorkshire West Riding 107, and Staffordshire 104. The fall in the incidence of acute pneumonia was confined to the northern section of the country; in the remaining areas the trend remained practically unchanged. A new low record for diphtheria was established, the notifications being 2 below the preceding lowest level. A large part of the fall in diphtheria was contributed by Lancashire, where the notifications declined from 40 to 15, the lowest return ever recorded in this county. Only small changes occurred in the local returns of whooping-cough; the largest was an increase of 41 in Northumberland. Although the notifications of scarlet fever for the whole country were practically unchanged some variation in local trends occurred; the chief were an increase of 43 in the south-eastern counties, an increase of 39 in Yorkshire West Riding and a decrease of 32 in Lancashire.

Only thirteen cases of acute poliomyelitis were notified, and the incidence is now about twice the level of the pre-epidemic period. The only counties with more than one notification were Bedfordshire 2 and Leicestershire 2.

No further cases of dysentery were notified from the outbreaks in Sussex and Derbyshire, where 36 and 68 cases were reported last week. The chief centres of infection during the week were Lancashire 29 (Liverpool C.B. 10, Prestwich M.B. 9); London 26 (Kensington 7, Bethnal Green 6); Yorkshire West Riding 23 (Sheffield C.B. 16); Warwickshire 10 (Warwick R.D. 8).

In *Scotland* increases were recorded in the notifications of diphtheria 7 and dysentery 41, and decreases were reported for measles 68 and whooping-cough 18. The largest increase in dysentery was that of Glasgow, where the cases rose from 6 to 34. A rise of 6 was recorded in the notifications of diphtheria in Glasgow.

In *Eire* a rise of 15 in the notifications of diarrhoea and enteritis and a fall of 9 for diphtheria were the chief features of the returns. The increased incidence of diarrhoea and enteritis was contributed by Dublin C.B.

In *Northern Ireland* an increase of 15 was reported in notifications of measles from Belfast C.B.

Vital Statistics, 1947

The provisional rates for England and Wales during 1947 published in the quarterly report for December show some interesting contrasts with preceding years. The birth rate was 20.5 per 1,000 and was 1.4 above that for 1946; it was the highest recorded since 1921. Infant mortality rate was 41 per 1,000 live births and was the lowest ever recorded in this country, being 2 below the previous lowest level of 1946. The proportion of stillbirths—24 per 1,000 total births—was the lowest ever recorded in England and Wales. The illegitimacy rate among live births was 18 per 1,000 below the average of the five preceding years. The general death rate was 12.0 per 1,000 and was 0.5 above the 1946 rate.

Week Ending May 8

The notifications of infectious diseases in England and Wales during the week included: scarlet fever 1,578, whooping-cough 3,110, diphtheria 143, measles 10,156, acute pneumonia 509, cerebrospinal fever 46, acute poliomyelitis 9, dysentery 108, paratyphoid 5, and typhoid 8.

No. 18

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended May 1.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.
Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.
A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

Disease	1948 (a)	(b)	(c)	(d)	(e)	1947 (Corresponding Week) (a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	57	5	18	5	1	52	5	27	1	—
Deaths		1	—				—	2		
Diphtheria	134	16	49	8	7	186	16	40	12	2
Deaths	2	—	—	—	—	2	—	1	1	—
Dysentery	119	26	57	—	—	122	8	13	—	—
Deaths				—	—				—	—
Encephalitis lethargica, acute	—	—	1	—	—	3	1	—	—	—
Deaths		—					—			
Erysipelas			27	13	4			33	11	1
Deaths		—					—			
Infective enteritis or diarrhoea under 2 years				32					18	
Deaths	30	4	9	7	—	73	6	11	7	—
Measles*	10,169	1101	228	113	62	8,442	363	230	45	20
Deaths†			1	—	—	10	—	1	1	—
Ophthalmia neonatorum	62	4	15	2	2	87	5	13	1	—
Deaths										
Paratyphoid fever	3	1	—	—	—	1	—	—	—	—
Deaths	—	—	—	—	—	—	—	—	—	—
Pneumonia, influenzal	546	33	3	13	7	516	31	5	15	2
Deaths (from influenza)‡	7	—	—	2	—	12	2	1	1	—
Pneumonia, primary			201	39				166	19	
Deaths	155	23		8	5		31		10	9
Polio-encephalitis, acute	—	—				3	—			
Deaths		—					—			
Poliomyelitis, acute	13	1	1	—	—	7	—	1	3	—
Deaths§	1						—			
Puerperal fever		1	10		1		—	7		—
Deaths										
Puerperal pyrexia‖	112	7	11	—	2	122	9	7	4	—
Deaths		—					—			
Relapsing fever	—	—			—	—	—			—
Deaths										
Scarlet fever	1,538	104	259	37	41	873	78	125	24	27
Deaths†			—	—	—	2	—	—	—	—
Smallpox	—	—	—	—	—	1	—	—	—	—
Deaths				—	—				—	—
Typhoid fever	12	—	1	—	—	1	—	2	—	—
Deaths	1	—	—	—	—	—	—	—	—	—
Typhus fever	—	—	—	—	—	—	—	—	—	—
Deaths				—	—				—	—
Whooping-cough*	3,684	253	37	55	15	2,033	250	255	55	13
Deaths	4	—	—	1	—	11	3	—	5	3
Deaths (0–1 year)	295	47	54	21	13	442	51	78	43	17
Infant mortality rate (per 1,000 live births)										
Deaths (excluding stillbirths)	4,150	671	562	174	112	4,577	667	645	204	119
Annual death rate (per 1,000 persons living)			11·3	10·9				13·4	12·9	
Live births	8,049	1291	1001	413	275	9,570	1451	1222	495	274
Annual rate per 1,000 persons living			20·2	25·8				24·6	31·2	
Stillbirths	200	25	28			259	47	28		
Rate per 1,000 total births (including stillborn)			27					22		

* Measles and whooping-cough are not notifiable in Scotland, and the returns are therefore an approximation only.
† Deaths from measles and scarlet fever for England and Wales, London (administrative county), will no longer be published.
‡ Includes primary form for England and Wales, London (administrative county), and Northern Ireland.
§ The number of deaths from poliomyelitis and polio-encephalitis for England and Wales, London (administrative county), are combined.
‖ Includes puerperal fever for England and Wales and Eire.

Medical News

Prof. G. Grey Turner

G. Grey Turner, M.S., F.R.C.S., Emeritus Professor of Surgery in the University of London, has been elected a Foreign Corresponding Member of the French Académie Nationale de Médecine.

Accommodation at Annual Meeting

The accommodation at Cambridge for the Annual Meeting of the B.M.A. is limited. In order that the arrangements may run smoothly we would ask those who intend being present to notify the Executive Officer as soon as possible. The form for doing so appeared in the *Supplements* of April 24, May 8, and May 15.

Awards for Penicillin Research

Sir Alexander Fleming, F.R.S., and Sir Howard Florey, F.R.S., were presented with the United States Medal for Merit on May 18 by Mr. Lewis Douglas, the United States ambassador. The award is for their research on penicillin.

Physical Education Appointment

Dr. Ernst Jokl has been appointed Physical Education Research Officer to the Union Education Department by the South African Government.

Danish Surgeon's Visit

Dr. Jens Foged, Chief Surgeon at the Bispebjerg Hospital in Copenhagen, is spending a month in Britain under the auspices of the British Council to meet plastic and gastric surgeons.

Golf Competition

The Manchester and District Medical Golfers Association will be holding its Annual Competition on May 26 at Mere, Cheshire. Particulars about membership of the club may be obtained from the Honorary Secretaries, Manchester and District Medical Golfers Association, c/o British Medical Bureau, 33, Cross Street, Manchester, 2.

Third International Blood Transfusion Congress

Dr. H. F. Brewer has been appointed to represent the British Red Cross Society's London Blood Transfusion Service at the Third International Blood Transfusion Congress which is being held at Turin from May 30 to June 2 inclusive.

Control of Poisons

The following substances are added to Part I of the Poisons List and to the First Schedule to the Poisons Rules: Amidone and its salts, carbachol, alkaloids of curare and curare bases (in substitution for "curarine," which is now deleted from the List and the Schedule), metopon and its salts, sodium monofluoracetate. Allylisopropylacetylurea is deleted from the Seventh Schedule and added to the Fourth Schedule to the Poisons Rules. It thus becomes subject to the same conditions with respect to supply and labelling as the barbiturates and sulphonamides. The requirement about colouring is widened to include arsenical poisons intended for the treatment of any infestation; lead arsenate paste and powder must now be coloured, and the colouring must be of such a nature as to be apparent whether the poison is dry, or wet, or in solution.

Spens Report on Dentists

The Report of the Interdepartmental Committee (Chairman, Sir Will Spens) on the Remuneration of General Dental Practitioners has been published as a White Paper (H.M.S.O., 4d.). The Committee was appointed on Sept. 2, 1946, to consider "what ought to be the range of total professional income of a registered dental practitioner," with regard to the normal financial expectations of dental practice in the past and the desirability of maintaining the status of the profession. Net incomes—that is, gross remuneration less professional expenses allowed for income tax—were examined in terms of the 1939 value of money. The Committee found that very few dentists make large incomes, that most earn less than enough to meet minimum middle-class expenditure, and that a quarter of the profession live below this standard. Witnesses impressed the Committee with the exceptional arduousness of dental work and it concludes that to work more than about 33 hours by the chair-side for 46 weeks a year tends to impair efficiency. Recruitment is poor and the profession must be made more attractive. The Committee recommends that 1938 incomes below £400 should be doubled, those of £400–£800 should be augmented by £400, and those above £800 should be augmented by one-third of the amount by which they fall short of £2,000. An experienced dentist working single handed and fully employed for the hours suggested should earn £1,600 net. However, if there were sufficient dental practitioners in relation to demand to secure a spread of incomes comparable to that of 1938, 75% aged between 35 and 54 should receive over £850 a year, 50% over £1,100 a year, and 25% over £1,400. Practitioners with junior partners or salaried assistants could properly earn more, as could the younger and more energetic dentists working more than 33 hours a week. Special provision should be made for dentists serving sparsely populated areas. Dental specialists with higher qualifications ought to be remunerated within the same range as medical specialists.

Chelsea Clinical Society

The annual dinner of the 51st session of the Chelsea Clinical Society was held at the South Kensington Hotel on May 11. The toast of the Society was proposed by Sir Walter Monckton, K.C. Speaking as a representative of a "much misunderstood" profession, Sir Walter touched wittily upon the relations between Medicine and Law. In his reply the President, Dr. Neil Maclay, gave the briefest possible account of a successful year in which the Society had achieved a balanced budget. Mr. Ivor Back proposed the toast of the guests, and Sir Leonard Stone, K.C., replied. At the close of the evening Dr. Maclay handed over the badge of office to the new President, Mr. Nils Eckhoff.

Wills

Dr. Arthur Charles Douglas Firth, formerly consulting physician to King's College Hospital, left £21,243; Dr. George Harold Lowe, of Middlesbrough, £15,570; Dr. Alexander Moxon Webber, of Sandown, Isle of Wight, £13,067; Dr. Edward Raymond William Gilmore, formerly M.O.H. for Leamington Spa, £4,645; and Lieut.-Col. John Lumsden Lunham, late I.M.S., £92,143.

COMING EVENTS

Hygiene in Food and Drink Industry

A joint meeting of the Food Group of the Society of Chemical Industry and the Royal Sanitary Institute will be held at Royal Hall, Ripon Road, Harrogate, on Friday, May 28, at 10 a.m., when the general subject for discussion will be "The Cleaning and Sterilizing of Plant in the Food and Drink Industry." The meeting will constitute the Food and Nutrition Section of the Health Congress of the Royal Sanitary Institute, which will be held at Harrogate from May 24 to 28.

Training of Social Therapists

A full-time three months' course for the training of social therapists will begin on June 1 and a year's evening course on Oct. 18. The fees for the courses, which are being given under the auspices of the Institute of Social Psychiatry, are £26 5s. and £52 10s., respectively. Inquiries should be addressed to the Social Psychotherapy Centre, 7, Fellows Road, London, N.W.3.

Westminster Hospital (All Saints') Urological Centre

Dame Katherine Watt, D.B.E., R.R.C., Chief Nursing Officer of the Ministry of Health, will open a new nurses' home at the Westminster Hospital (All Saints') Urological Centre, Austral Street, West Square, London, S.E., on Thursday, June 3, at 2.15 for 2.30 p.m.

SOCIETIES AND LECTURES

Monday

EDINBURGH UNIVERSITY: PHYSIOLOGY CLASSROOM.—May 24, 5 p.m. "*The Great Epidemics of History*," by Dr. Douglas Guthrie.

UNIVERSITY COLLEGE LONDON.—At Anatomy Theatre, Gower Street, W.C., May 24, 5.30 p.m. Shearman Lecture: "*The Origin and Nature of Scientific Thought*," by Mr. E. Schrödinger, Ph.D., D.Sc.

Tuesday

EDINBURGH POSTGRADUATE BOARD FOR MEDICINE.—At Edinburgh Royal Infirmary, May 25, 5 p.m. "*Clinical Physiology of the Pulmonary Circulation*," by Prof. W. Melville Arnott.

EUGENICS SOCIETY.—At Burlington House, Piccadilly, London, W., May 25, 5.30 p.m. "*Migration and the British Commonwealth*," by Prof. Brinley Thomas, M.A., Ph.D.

INSTITUTE OF DERMATOLOGY, 5, Lisle Street, Leicester Square, London, W.C.—May 25, 5 p.m. "*Bullous Eruptions*," by Dr. R. T. Brain.

Wednesday

GLASGOW UNIVERSITY: DEPARTMENT OF OPHTHALMOLOGY.—May 26, 8 p.m. "*Cataract Extraction*," by Mr. O. M. Duthie.

UNIVERSITY COLLEGE LONDON.—At Physiology Theatre, St. Mary's Hospital Medical School, Paddington, W., May 26, 5 p.m. Special Lecture: "*The Localization and the Role of Nucleic Acids in the Cell*," by Prof. J. Brachet (Brussels). At Anatomy Theatre, University College, Gower Street, W.C., 5.30 p.m. Shearman Lecture: "*The Origin and Nature of Scientific Thought*," by Mr. E. Schrödinger, Ph.D., D.Sc.

Thursday

BRITISH INSTITUTE OF RADIOLOGY.—At Reid-Knox Hall, 32, Welbeck Street, London, W., May 27, 6 p.m. "*The Roentgen-Anatomical Appearance of Infantile Pyloric Stenosis, Before, During, and After the Manifest Stage of the Disease*," by Dr. Gosta Runström (Gothenburg).

EDINBURGH ROYAL INFIRMARY.—May 27, 4.30 p.m. Honyman Gillespie Lecture: "*Partial Gastrectomy for Peptic Ulcer*," by Mr. H. W. Porter.

MEDICO-LEGAL SOCIETY.—At 26, Portland Place, London, W., May 27, 8.15 p.m. "*The Investigation of Crime*," by Cyril R. M. Cuthbert, Chief Detective Inspector, Metropolitan Police Laboratory.

UNIVERSITY COLLEGE LONDON: DEPARTMENT OF PHARMACOLOGY.—At Physiology Theatre, Gower Street, London, W.C., May 27, 5.15 p.m. "*Biological Responses to Drugs*," by Mr. J. F. Danielli, Ph.D., D.Sc.

Friday

KENT AND CANTERBURY HOSPITAL, Canterbury.—May 28, 5 p.m., Monthly Clinical Meeting.

UNIVERSITY COLLEGE LONDON.—At Physiology Theatre, St. Mary's Hospital Medical School, Paddington, W., May 28, 5 p.m. Special Lecture: "*The Localization and the Role of Nucleic Acids in the Embryo*," by Prof. J. Brachet (Brussels). At Anatomy Theatre, University College, Gower Street, W.C., 5.30 p.m. Shearman Lecture: "*The Origin and Nature of Scientific Thought*," by Mr. E. Schrödinger, Ph.D., D.Sc.

Saturday

BIOCHEMICAL SOCIETY.—At Department of Biochemistry, University Museum, Oxford, May 29, 1 p.m., 267th meeting of the Society. Papers will be read.

APPOINTMENTS

Duncan Yuille, M.B., Ch.B., has been appointed to succeed Dr. Gebbie as Divisional Surgeon of the Hull Northern Division of the St. John Ambulance Brigade.

HOSPITAL FOR SICK CHILDREN, Great Ormond Street, London, W.C.—*First Assistant Anaesthetist*, T. B. L. Roberts, M.R.C.S., L.R.C.P., D.A. *Resident Medical Registrar and Pathologist*, D. A. Williamson, M.D., M.R.C.P., D.C.H. *House-physician*, J. D. H. Matthews, M.B., Ch.B., M.R.C.P., D.C.H. *House-surgeon*, J. P. Rochford, B.M., B.Ch.

LONDON COUNTY COUNCIL.—The following appointments in the Council's Mental Health Services are announced at the hospitals indicated in parentheses. *Assistant Medical Officers:* J. Donnelly, M.B., Ch.B. (Cane Hill); M. Engler, M.D. (St. Lawrence's); A. L. Hughes, M.B., Ch.B. (The Manor); R. Krambach, M.D., D.P.M., and E. J. Rich, M.B., B.S. (Claybury); J. Kruger, M.D., M.R.C.O G. (Banstead); H. H. Robinson, M.B., B.Ch. (St. Ebba's); T. St. J. H. Silvester, M.R.C.S., L.R.C.P. (Bexley).

LUDLAM, G. B., M.B., Ch.B., D.L.O., D.T.M. & H., Director, City Bacteriological Laboratory, Nottingham.

MITCHELL, ROBERT, M.B., Ch.B., D.P.H., Assistant Medical Officer of Health, County Borough of Bury.

PETERS, P. M., B.M., B.Ch., Assistant Pathologist, Department of Morbid Anatomy, Prince of Wales's General Hospital, London, N.

BIRTHS, MARRIAGES, AND DEATHS

BIRTHS

Fisk.—On May 5, 1948, at Stella Maris Nursing Home, Cambridge, to Dr. Susan Airey, wife of Geoffrey Fisk, M.B., F.R.C.S.Ed., Wing Commander, a daughter—Susan Clare.

Howat.—On May 11, 1948, at Newcastle, to Margaret Harker, wife of James Howat, a son.

DEATHS

Aitchison.—On May 9, 1948, at Cotswold Sanatorium, Charles Umpherston Aitchison, M.R.C.S., L.R.C.P., aged 38.

Arnold.—On May 10, 1948, Edwin Gilbert Emerson Arnold, M.D., M.R.C.P.

Arthur.—On May 12, 1948, at Noys End, Brockham, Betchworth, Surrey, Joseph Hugh Arthur, M.D., aged 73.

Caddy.—On April 15, 1948, in Melbourne, Arnold Caddy, F.R.C.S., of Chandpara, Tylden, Victoria, Australia, aged 81.

Dickinson.—On May 8, 1948, at Royal Hospital, Sheffield, William Robinson Dickinson, M.R.C.S., L.R.C.P, of Loxley, Hough Lane, Wombwell, Yorks, aged 52.

Gray.—On May 4, 1948, at Girvan, Alexander Gray, M.B., Ch.B.Glas., of 46, Main Street, St. Ninians, Stirling.

Kilkelly.—On May 9, 1948, at Cooldaniel, Greystones, Co. Wicklow, Eire, Patrick Percy Kilkelly, M.B., B.Ch., Lieutenant-Colonel, I.M.S., retired.

Macintyre.—On May 11, 1948, at The Neuk, Lanark, John Macintyre, M.B., Ch.B.Glas., D.P.H.

Richardson.—On May 11, 1948, at Bucklands, Dover, Joseph Richard Whitehead Richardson, M.R.C.S., L.R.C.P., aged 48.

Stone.—On April 10, 1948, at 6, Cheyne Walk, Northampton, David Stone, M.D., C.M.Glas., aged 82.

Thom.—On May 8, 1948, at Castlepark, Lanark, Ernest Graham Young Thom, M.B., Ch.B.

Vines.—On May 8, 1948, at Brodawel, Newport, Mon., Charles Stuart Vines, M.R.C.S, L.R.C.P., D.P.H., aged 82.

Any Questions?

Correspondents should give their names and addresses (not for publication) and include all relevant details in their questions, which should be typed. We publish here a selection of those questions and answers which seem to be of general interest.

Pleural Effusion

Q.—*What is the correct method of investigation of a pleural effusion? When the diagnosis is in doubt, is guinea-pig inoculation of value? I have difficulty in distinguishing between effusions of tuberculous, pneumonic, neoplastic, and transudate origin. The problem is particularly difficult in the following two circumstances: (a) in patients who have been treated—e.g., by chemotherapy—for some little time before admission to hospital; and (b) where the effusion is so large that it obscures all, or the greater part of, the underlying lung tissue. I have always regarded guinea-pig inoculation as a pointer to diagnosis, but some of my colleagues maintain that it is of little value.*

A.—In the investigation of a pleural effusion the history and clinical findings are of the greatest importance. The chief varieties which must be distinguished are the "idiopathic"—the majority of which are tuberculous—the pyogenic, and the malignant. In the malignant group the history, age of the patient, and blood-staining of the effusion are important diagnostic points. A tuberculous effusion is relatively uncommon in a patient of carcinoma age. The frankly pyogenic effusion—e.g., complicating pneumonia or lung abscess—rapidly becomes an acute empyema, but after chemotherapy a sterile effusion may result. It may be very difficult to differentiate between this and a tuberculous effusion, but the predominant cells are usually polymorphs and the history of an acute pulmonary infection may be a guide. In a tuberculous effusion the age of the patient, mode of onset, and history of contact may aid the diagnosis. Loewenstein culture or, better still, guinea-pig inoculation of the fluid should be performed in all cases, and some authorities claim a positive result from inoculation in three out of four tuberculous effusions. This is an optimistic estimate. A negative result does not exclude tuberculosis.

Alternative to Venesection

Q.—*While in America during the war I was told of a clinical procedure carried out in acute left-sided heart failure. The rationale of venesection in acute pulmonary oedema or in a hypertensive "cardiac asthma" attack is to relieve the load on the left ventricle and also perhaps on the right. In the U.S.A. it seems to be a common alternative to venesection to apply two sphygmomanometer bands to alternate limbs for, say, 20 minutes, and then to repeat on the other two limbs. The bands are applied at a pressure midway between the diastolic and systolic. This acts at once in stopping large quantities of venous blood returning to the heart, and is apparently effective in treating these conditions. Has this treatment been tried in this country?*

A.—The method of reducing the return of blood to the heart described in the question has been used in this country for a number of years. The effect is immediate, the pressure in the right auricle being reduced and the cardiac output increased. On releasing the cuffs the blood return is reduced for some time by the vasodilatation induced in the treated limbs. Its danger lies in the possible production of thrombophlebitis by obliteration of superficial veins or in the formation of thrombi in deep muscle capillaries which may spread and result in pulmonary infarction.

Removal of Tattoo Marks

Q.—*Is it possible to remove tattoo marks from the body by plastic surgery or by any other method?*

A.—Tattoo marks are foreign bodies in the skin and can only be removed surgically. The removal of tattoo marks from most of the favourite sites on the body is possible by excision and plastic repair. In the case of small designs the defect can often be closed by sliding flaps and direct suture.

In most cases, however, the raw area is best filled with a split skin graft. On a fresh base this should "take" excellently. The only other useful method is to modify or black out the design by further tattooing. Splitting the skin in the hope of removing the marks is rarely successful, as the particles lie too deeply imbedded in the dermis.

Proetz Displacement Method

Q.—*Though the Proetz displacement method using a solution of ephedrine is mentioned in textbooks as having a place in the treatment of maxillary sinusitis, I am unable to find out the practical details involved—e.g., the quantity of solution used, the position of the patient's head, and the method of evacuating air from the sinus so as to ensure its replacement by the solution. Could you supply this information?*

A.—The Proetz syringe has 5- and 10-ml. graduation marks on the glass barrel. The patient lies flat on the back, with a small pillow under the shoulders, so that the head is almost upside down. Breathing quietly through the mouth, the patient introduces 5 ml. of the solution, usually 0.5 or 0.75% ephedrine in normal saline, into one nostril. The syringe is then removed, the bulb squeezed, and the nozzle reinserted. The other nostril is occluded and the bulb allowed to expand. If no suction is experienced the process is repeated while the patient says, "Kick, kick, kick." After repeating this suction once or twice sufficient solution should have entered the sinuses, and the other side can then, if necessary, be treated in exactly the same way. It will be found easier to try the method first with the syringe empty.

Stilboestrol and New Growth

Q.—*Has stilboestrol ever been responsible for the disappearance of a new growth? A woman, aged 60, had a hard growth, which was beginning to ulcerate and was firmly attached to the sternum. Seemingly it was a sarcoma of the sternum, but more likely was a carcinoma arising in the left breast. The condition had been present for 18 months, but when first seen five months ago she had a left pleural effusion, was breathless in bed, and apparently moribund. Her only treatment has been stilboestrol 5 mg. thrice daily, and on this she has made a remarkable recovery; she is now doing light housework. The growth itself has almost disappeared. What is the expectancy of life in this case, and how long should the stilboestrol be continued?*

A.—So far as is known, stilboestrol has never effected the complete regression and permanent disappearance of a new growth. When treated with oestrogens, some 5% of post-menopausal cases of cancer of the breast (such as the above is presumed to be) may improve in a similar way to that described. Improvement is temporary, however, and although its duration is usually no more than several months, cases have been observed in which the disease appeared to be quiescent for considerably longer periods. Nevertheless, in the majority of such cases the expectation of life is not likely to be demonstrably greater than without treatment. Since exceptionally favourable responses undoubtedly occur, even although unpredictably, stilboestrol therapy should be continued.

Diarrhoea due to Salmonella typhi murium

Q.—*A patient has had attacks of diarrhoea for twelve months which recently were proved to be due to S. typhi murium. Can you suggest ways of permanently destroying the organism in his bowel?*

A.—*S. typhi murium* is a common cause of acute gastro-enteritis and is one of the organisms most often responsible for outbreaks of food-poisoning. Occasionally it may give rise to a more prolonged fever accompanied by gastro-intestinal symptoms, but it would be most unusual for it to lead to recurrent attacks of diarrhoea over a period of a year. A number of those infected remain carriers, and it is possible that the organism in the present case is merely saprophytic. Nevertheless it is clearly important to try to eliminate it from the patient's stools, as its persistence is a danger to the community. The only agents likely to be effective are sulphaguanidine, sulphasuxidine, or phthalyl sulphathiazole. Suitable doses for such a purpose in an adult would be 2 g., 1.5 g., and 1.5 g., respectively, six times daily for about ten days.

Surgical Treatment of Peptic Ulcer

Q.—*It has been shown that a peptic ulcer which is bathed in alkaline secretion always heals. Why, then, in the operation of partial gastrectomy for duodenal ulcer is it considered necessary to dissect out and remove the ulcer instead of being satisfied with a prepyloric division of the stomach with dissection and removal of the pyloric mucous membrane? The dissection of the duodenum is almost always the most difficult and even dangerous part of the operation.*

A.—Theoretically, Bancroft's operation, or a prepyloric resection combined with removal of the antral mucosa, is a perfectly satisfactory answer to the surgical treatment of duodenal ulcer. In fact the operation is not so simple as it sounds, because (1) haemorrhage from the cut mucosa inside the musculo-serous sac of the antrum is often profuse and difficult to deal with, and (2) the closure of the thickened wall of the antrum is seldom as efficient as that of a duodenal stump. In the case of a difficult adherent duodenal ulcer the better procedure is probably the two-stage gastrectomy—a primary prepyloric resection followed a month to six weeks later by the removal of the pylorus and first part of the duodenum with the ulcer. This second stage is often surprisingly easy.

Acne Rosacea

Q.—*A farmer, aged 55, suffers from rosacea and is developing a vascularizing keratitis in both eyes. Is there any evidence to show that daily intravenous injections of nicotinic acid 50–100 mg., together with bi-weekly intramuscular injections of riboflavin 10 mg., would benefit the condition? In view of the intense flushing of the face that would occur after the nicotinic acid injection, is this treatment contraindicated?*

A.—Results are claimed for the use of riboflavin in acne rosacea. The evidence for nicotinic acid is more scanty. Treatment is on the whole disappointing. While there is some justification for the use of riboflavin, attention must be concentrated on standard and orthodox measures such as atropine drops where the corneal condition calls for it. It would appear that the best results are perhaps obtained from *x*-ray treatment in doses of 50 r.

NOTES AND COMMENTS

Antrochoanal Polypi.—Dr. GAVIN YOUNG (Glasgow) writes: With reference to the answer on this subject ("Any Questions?" May 1, p. 866), it might have been added that by far the most common cause of anosmia is the "waterlogging" of the mucosa of the olfactory cleft associated with nasal allergy. The antral cavities mentioned in the question may well have been the subject of allergy with superadded infection. It is the writer's firm conviction that the incidence of nasal allergy is very greatly on the increase, possibly the result of food deficiencies.

Congenital Deafness and German Measles.—Dr. K. HAZELL, of the Metropolitan Ear, Nose and Throat Hospital, London, writes: I am anxious to receive information from doctors on this subject. (1) Concerning patients congenitally deaf: whether the mother (i) had a rash during pregnancy; (ii) did it resemble German measles? (iii) at what time after conception? (iv) in which year? (v) did she, previous to pregnancy, have German measles? (2) Concerning German measles (or a disease resembling it) during pregnancy: was the child subsequently normal or abnormal, and, if the latter, how affected?

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